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AN INTEGRATION, LONG RANGE PLANNING, AND MIGRATION GUIDE FOR THE STOCK POINT LOGISTICS INTEGRATED COMMUNICATIONS PROJECT

By

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March 1986

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An Integration, Long Range Planning, and Migration Guide for the Stock Point Logistics Integrated Communications Project

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ABSTRACT

Strategic planning is receiving increased emphasis in both public and private sector organizations. This increased emphasis has recently been evident in the Naval Supply Systems Command (NAVSUP) which issued its formal Strategic Plan in June 1985.

After issuance of such a plan, organizational components should realign their programs and projects to become in consonance with the corporate plan of action. This thesis analyzes the existing and planned Stock Point Logistics Integrated Communications (SPLICE) Project initiatives in light of the NAVSUP Strategic Plan. The results of these analyzes are recommendations which will bring the SPLICE Project application, external system interface, and system migration plans into closer harmony with the NAVSUP Strategic Plan.

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I. INTRODUCTION

A. THE PURPOSE

The purpose of this thesis is to assist the Naval Supply Systems Command (NAVSUP) Stock Point Logistics Integrated Communications Environment (SPLICE) project office, SUP 0472, in accomplishing the task of strategic and, to a limited extent, tactical project planning. As a result of this effort, a long range SPLICE project planning guide will emerge.

B. THE PLANNING PROBLEM

Since this thesis will address project planning, the immediate problem becomes: upon what should SPLICE project planning be based within NAVSUP? Once this question is answered, the follow-on problem of what changes must be made to the existing SPLICE project plans will be addressed, in light of the answer.

C. METHODOLOGY

A key element that appears to differentiate well managed organizations from average or mediocre organizations is the degree, levels, and cohesiveness of planning used by management. Thompson and Strickland [Ref. 1] support this position. Their research leads them to claim that managers in more successful organizations make time to formulate a

systematic blueprint of management's answers to three critical questions:

1. What does the organization do and for whom?
2. What objectives does the organization want to achieve, over what period of time, and how are these objectives measured?
3. How must the organization be managed or changed to achieve the objectives and measure performance?

The document which an organization produces that contains the answers to these questions is its strategic plan.

At the highest levels of management, a strategic plan may be referred to as a corporate plan. To have any degree of impact on an organization, a strategic plan must be embraced by all levels of management and translated into associated lower level plans of action or strategies with stated measurable objectives. At middle management levels, the implementation strategies and objectives to achieve the corporate goals are called business plans or functional area plans. In terms of automated data processing (ADP) systems, the applicable functional area plan is often referred to as the Management Information Systems Plan and its corresponding architecture [Ref. 2]. At the lowest levels of management, operational, tactical, or project plans provide "the nuts and bolts" of how the business or functional area plans will be carried out. Success or failure of the corporate plan depends heavily on how well the lower level plans fit or are made to fit the corporate strategy, how performance is measured, and how corrective

action is applied to lower level plans for deviations from the corporate plan.

The Thompson and Strickland model of basing operational, tactical, or project plans on corporate and functional area plans will be the methodology used within this thesis for proposing modifications to SPLICE project plans.

D. THE NAVSUP STRATEGIC PLAN

The trend found in the more successful organizations to perform formal corporate planning has not gone unnoticed in the public sector. Of particular importance to this thesis was the decision by NAVSUP in 1985 to produce a formal corporate plan, which was called the NAVSUP Strategic Plan [Ref. 3].

The NAVSUP Strategic Plan is the result of over a years worth of effort by headquarters top management personnel in mapping where the "corporation" is and where it should be going. It essentially replaces previous NAVSUP strategy and planning tools, such as the "Key Indictor" program and the "Top Concerns" lists. An indication of the seriousness of this planning effort comes from the fact that during a three month period within this year, virtually all Division Directors and/or Deputies at the headquarters were sequestered to an off site location (from NAVSUP) to permit undivided attention to the development of this plan. Subsequent actions taken in support of this plan included numerous area specific steering committee meetings and a

reorganization of some directorates at NAVSUP itself in order to better implement the plan.

The NAVSUP Strategic Plan restructured the three basic questions posed by Thompson and Strickland into the following four questions:

1. What is our job?
2. Who are we?
3. Where are we going?
4. How do we get there?

The plan answers the first question in terms of reiterating the NAVSUP mission, including its scope and responsibilities. The second question is answered in terms of defining the internal and external environment NAVSUP faces. The environment is described in terms of a detailed corporate profile and a listing of laws, regulations and policy directions with which it must coexist. The third question was answered by defining nine critical success factors with related goals. In the context of this plan, goals appear as long term results that NAVSUP wishes to achieve. The final question was answered in terms of stating 78 opportunities, 65 assumptions, 38 strategies, and 125 objectives. Opportunities appear as situations which may be developed or capitalized upon for the advancement of the organization. Assumptions are statements about the anticipated future position of the organization. Strategies appear as means to accomplish goals by providing corporate

direction and intent. Objectives appear as immediate, short run actions which implement strategies and which should be supported by tactical initiatives. Objectives are measured through estimated completion dates only.

E. THE NAVSUP STRATEGIC INFORMATION SYSTEM PLAN

The task of developing an Information Systems Plan which supports the Strategic Plan fell under the purview of the NAVSUP Deputy Commander for Inventory and Information Systems Development (SUP 04). SUP 04 directed the creation of an Information Systems Steering Committee and Planning Team with representatives from each SUP 04 division to develop the NAVSUP Strategic Information Systems Plan. Using the format of the NAVSUP Strategic Plan, the same four basic questions were answered, but the answers were tailored to the specific mission area of SUP 04. The definitions of goals, opportunities, assumptions, strategies, and objectives appear consistent with those used in the NAVSUP Strategic Plan. The result of this effort was the approved NAVSUP Strategic Information Plan of 12 June 1985 [Ref. 4].

Using the Thompson and Strickland model, the SPLICE project, which falls under SUP 04, should base its project plans upon the new NAVSUP Strategic Information System Plan, which itself is based upon the NAVSUP Strategic Plan. It is appropriate, therefore, to examine the NAVSUP Strategic Information Systems Plan prior to discussing specific SPLICE project plans or changes to them.

The seven goals listed in the NAVSUP Strategic Information System Plan are directly related to eight of the nine critical success factors and associated goals listed in the NAVSUP Strategic Plan. These goals are:

1. Assure that the Material Requirements Determination Program fully supports fleet and weapons system logistics support requirements.

2. Establish and administer an effective NAVSUP Information Resources Management Program including data administration, so that information is managed as a resource.

3. Assure that on-going and future information system initiatives provide security, data accuracy, maximum integration, and timely return on investment.

4. Assure that NAVSUP information system modernization efforts result in improved user effectiveness, increased productivity, and better use of Navy resources.

5. Obtain and retain qualified personnel including functional specialists who can articulate user requirements in the system design process.

6. Ensure SUP 04 develops and maintains comprehensive strategic and tactical plans, performs effective budgeting, and efficiently manages its corporate assets consistent with the overall NAVSUP mission and goals.

7. Assure that NAVSUP effectively exploits new and emerging information system technology.

Of these seven goals, all but number five are seen as directly impacted by the SPLICE project. SPLICE can also support number five indirectly through the applications which utilize it.

The heart of NAVSUP Strategic Information System Plan lies in the Opportunities, Assumptions, Strategies and Objectives portions of the plan. These documents are

reproduced, in part, as appendices A through D.[1] Since the information contained in these four documents is so critical to lower level planning efforts, interpretation of some statements contained therein is necessary.

First, the identified opportunity area will be addressed. Sixty-three opportunities were developed by the Steering Committee. These opportunities "identified programmatic and technical options available to SUP 04 to improve operations and information systems effectiveness" [Ref. 5]. Of these 63 opportunities, 28 are seen as applicable to SPLICE and assumed operative. These 28 opportunities are identified in Appendix A by an asterisk (*) positioned next to the opportunity number. Three of these 28 opportunities require further qualification in terms of this document.

Opportunity number 18 refers to the incorporation of common data elements in an "integrated data base environment" which is to serve Inventory Control Points, Stock Points, Headquarters System Commands, and other ashore

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[1] Although the NAVSUP Strategic Information Systems Plan critical success factors and associated goals are specifically cross-referenced to the NAVSUP Strategic Plan, the follow-on opportunities, assumptions, strategies, and objectives are not in all cases (in the version held by the authors). The authors assume that all the NAVSUP Strategic Information Systems Plan opportunities, assumptions, strategies, and objectives completely and correctly correspond to those of the senior level plan, particularly those which indicate SUP 04 lead or assist responsibility.

and afloat units. The purpose of this is to reduce data redundancy and promote sharing, accessibility, and accuracy.

This opportunity implies that when geographically distinct system users or applications require use of common data, rather than store it locally (i.e., redundantly) the user or application should be able to access a centralized data storage facility to obtain that data, in real-time. Data so provided would be used in subsequent local processing.

Martin [Ref. 6] directly addresses this situation and states that commercially available data base management software is designed to work in a single computer environment or in a basically homogeneous computer complex. Few cooperative or even multiple vendor hardware (i.e., non-IBM compatible) data base management systems exist, the notable exception being ORACLE. No multi-vendor, integrated, distributed, and real-time database management system currently exists which supports all logistics system hardware suites. This fact will severely curtail efforts to reduce data redundancy.

With the wide divergence among hardware and software used by the logistics user community, their geographical dispersion, and their local operational system response time requirements, the creation of an "integrated data base environment" to achieve reduced data redundancy throughout the logistics system as implied in opportunity number 18

appears overly ambitious. With the hardware and software suits available, it may be possible to:

1. define and implement common data element definitions within a multitude of data dictionary/data directory systems;
2. and provide interoperability among the various users for access to individual data bases.

However, the use of common logistics data elements in an integrated, cooperative, and distributed data base environment across all logistics systems users without redundancy and meeting short response times does not appear technically or operationally feasible for the foreseeable future.

This document assumes that the opportunity for reduction in data redundancy is limited to individual NAVSUP collocated data bases, with incompatible or non-contiguous systems using redundant data, where necessary to meet real-time response requirements.

Opportunity number 23 describes the promotion of competition in future information system resource acquisitions through the use of portable and machine independent application programs. This opportunity must be interpreted from two aspects.

First, since most data base management systems, transaction processing monitors, and fourth generation languages are not portable, applications which use these facilities will be machine, or compatible hardware dependent. This will be particularly true for applications

which are re-written in fourth generation languages or application generators which take advantage of the productivity gains available to systems developers using such facilities.[2]

Secondly, opportunity 23 appears to be of lesser importance in light of opportunity 37, which indicates that opportunities exist for long term single vendor relationships. If such long term relationships are available and desirable, why worry about portability for new information resource acquisitions during the less than six year window of this plan? Are current, near term, or future NAVSUP applications intended for life cycles in excess of the current 15 to 24 year vendor hardware contracts? Should NAVSUP be planning now to port third or fourth generation applications to the fifth or sixth generation machines that will be available at the end of these long term single vendor relationships?

In light of these comments and for purposes of this document, opportunity number 23 will be assumed to apply solely to the functional area logic of existing and new COBOL applications. All data base access and usage code, transaction monitors, screen facilities, and fourth generation language code will be assumed to be non-portable and disposable.

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[2]See Appendix B, assumption numbers 21 and 45.

The final comment on opportunities addresses opportunity number 37, which discusses hardware and software contractual vehicles providing both technological refreshment and long term single vendor relationships. The former part of this opportunity poses no problem to the authors. The latter part stating the desire for long-term single vendor relationships does require interpretation.

This opportunity seems to exist in spite of the increased emphasis within NAVSUP on competition and procurement system breakouts.[3] Although there are well documented advantages to having a solid, long term relationship with a single hardware and software vendor, there are Navy and non-Navy ADP oversight organizations and committees that rank potential price and performance advantages in periodically recompeting all or portions of the hardware and software environment higher than the potential advantages gained through long term single vendor use. If required to periodically compete "portions" of long-term contractual vehicles, this may well mean multi-vendor support.

For purposes of this document, long term single vendor relationships will be considered preferable, but both contractual and physical facilities for integrating hardware and software from multiple vendors must always be available within procurement vehicles. Each technological refreshment

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[3]NAVSUP Strategic Plan strategy number 29 applies.

planned must be "scrubbed" for price and performance advantages in the marketplace. This opportunity is further interpreted to mean that government controlled integrating facilities will be available and used, if and when price or performance advantages can accrue to the government that will not be matched by existing single vendor contracts.

Moving to the area of assumptions, of the 45 listed in Appendix B, all but three are applicable to SPLICE and assumed applicable. Applicable assumptions are marked with an asterisk by the assumption number. Three of these assumptions require interpretation.

Assumption number 14 states that off-the-shelf data base management systems and automated data dictionaries will be used in all major systems. For the purposes of this document, this is interpreted to include existing systems which only have minimal or no real data base management facilities (e.g., file systems such as the Terminal Application Processing System (TAPS)[4] II on TANDEM) or with passive data dictionaries (e.g., TANDEM Data Definition Language). This assumption will further be interpreted to mean that no in-house actions will be undertaken for development of facilities of a similar nature.

Assumption number 20 is an elaboration on opportunity number 37, concerning the single vendor concept. For

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[4]TAPS is a product of Informatics General Corporation. It has facilities for application management, communications management, and data or file management.

purposes of this document, the comments made on opportunity number 37 also apply.

Assumption number 21 refers to the increased use of "high level" programming languages for ad hoc reports, queries, and the increased use of application generators in developing new systems. "High level" languages normally refer to third generation procedural languages such as COBOL, FORTRAN, or PL/1 [Ref. 7]. This document interprets this assumption to refer instead to fourth generation non-procedural and interactive query languages.

Of the 27 strategies listed in Appendix C, 18 are applicable to SPLICE, and are so indicated with an asterisks. Two comments on this section are necessary. First, strategy number 13 regarding portable and machine independent application programs is duplicative of opportunity number 23, which was discussed previously. If this duplication is not by design, one or the other should be eliminated. Second, the comments made to opportunity number 23 also apply to strategy number 13.

Ninety-eight objectives are stated in the plan and summarized in Appendix D. Of these, 41 are directly applicable to SPLICE and are so indicated with an asterisk next to the objective number. No objectives applicable to this thesis require interpretation.

F. SPLICE PROJECT PLANNING

With the NAVSUP Strategic Information Systems Plan in place along with the authors' interpretations, the next step will be an analysis of the SPLICE project in light of this plan. The path the authors will take to accomplish this effort is as follows. Following a presentation of the background of the SPLICE project, a "strawman" set of new project goals, strategies and objectives will be proposed. These will be based upon the NAVSUP Strategic Information System Plan outlined above and the capabilities present in SPLICE itself as outlined in the background chapter. Then, each existing or potential SPLICE project implementation or application area will be:

1. analyzed in terms of its intended purpose and benefits to the corporation;
2. analyzed in terms of migration need and potential to the Stock Point ADP Replacement (SPAR) Project;
3. summarized in terms of how it tactically supports or can better support proposed SPLICE objectives, thereby supporting previously proposed project goals and strategies.

The result of this effort will be an integrated set of SPLICE project goals, strategies, and objectives that, along with recommended changes to tactical initiatives, will reorient the project to be more in line with the NAVSUP Strategic Information Systems Plan, where divergence is encountered or where project capabilities can be used to accomplish previously unanticipated corporate objectives.

With this plan of action in mind, the SPLICE project background is next presented.

II. BACKGROUND

A. CHAPTER OVERVIEW

The SPLICE project, as it exists today, represents an evolutionary growth of on-line, distributed processing and telecommunications support within the NAVSUP data processing environment. At its inception as a joint NAVSUP and Navy Fleet Material Support Office (FMSO) effort, SPLICE's scope was merely to lessen the impact of capacity and local telecommunications problems associated with the stock point Burroughs medium systems. It was also to provide a standard local interactive processing capability and augment and replace existing Burroughs remote job entry (RJE) equipment [Ref. 8]. In contrast, SPLICE today has grown to encompass:

1. local high speed inter-computer communications for process-to-process interface, multi-host access from a single terminal, and peripheral resource sharing;

2. a base from which to develop and deploy new local and network oriented applications;

3. fault-tolerant application processing;

4. a medium to share Burroughs resident master files with or without directly accessing the Burroughs hosts;

5. the NAVSUP communications system backbone including an interface to the Defense Data Network (DDN) and non-DDN based heterogeneous system connectivity for interoperability, horizontally and vertically throughout the logistics system;

6. a vehicle to permit the use, replacement, or interface of multiple vendors' ADP hardware throughout the Navy logistics system;

7. a means of providing interim office automation, local area network, and management productivity tools to the stock points.

8. and a bridge for transition to the modern mainframe computers to be acquired by the SPAR Project.

The key features of SPLICE which have permitted the implementation of these divergent capabilities are:

1. A highly flexible and comprehensive contact for hardware, software, maintenance, training, documentation, and vendor support [Refs. 9 and 10], which includes technological refreshment capabilities;

2. A very responsive prime contractor, Federal Corporation (FDC), who has taken great pains to understand the breath and potential of the SPLICE project and has provided supplemental environmental software training, designs, and implementations which enhance the open architecture and processing capabilities of the project (e.g., SPLICENet [Ref. 11]);

3. A small, yet technically oriented project staff at both NAVSUP and FMSO, who have firmly guided the project to achieve its stated objectives;

4. A dedicated and well trained software staff at the NAVSUP Central Design Agency (CDA), FMSO, who are taking full advantage of the power, modularity, and flexibility of the SPLICE hardware and software provided in the contract.

In order to fully appreciate the role that SPLICE can play in fulfilling the goals, strategies, and objectives of both the NAVSUP Strategic and Strategic Information System plans, it is necessary to follow the growth in scope and capabilities of this project. The ability of the project to accommodate change and this growth in the past demonstrates the projects's flexibility and versatility in meeting the ever changing demands of the NAVSUP environment and serves as an indication of its ability to meet future corporate

needs. The following paragraphs fulfill this role, highlighting the above mentioned key features where appropriate.

B. EARLY HISTORY

The SPLICE project began in late 1977 as the result of a FMSO presentation[5] to NAVSUP concerning remaining deficiencies of the Burroughs medium systems in the areas of capacity, local telecommunications support, interactive processing support, and RJE support [Ref. 12]. These deficiencies require explanation to provide an understanding of the stock point environment and the initially planned role of SPLICE.

The Burroughs medium systems, then B3500s, had originally been competitively procured by NAVSUP in the early 1970's. These systems replaced earlier NAVSUP Uniform Automated Data Processing for Stock Point (UADPS-SP) hardware and software, which were IBM 1410 based or IBM 360/50 systems emulating 1410 hardware. In that the IBM 1410s were primarily batch oriented processors, the existing applications which were to be transitioned to the Burroughs hardware were primarily batch oriented. Transition to the Burroughs hardware was to be accomplished with limited

[5] This presentation is called within the project the SPLICE "Spaghetti Bowl Pitch".

redesign or modernization.[6] This resulted in the initial Burroughs systems also being primarily batch oriented. Prior to successful implementation of the transitioned UADPS-SP applications throughout the stock points, both system limitations and needed technological enhancements began to manifest themselves.[7]

The Burroughs off-the-shelf environmental software prior to initial UADPS-SP implementation appears to have been deficient in the common services, audit trail, scheduling, data communications, and disk accessing and storage areas. Applicable environmental software packages were, therefore, modified jointly through Burroughs and FMSO to provide:

1. common services and journaling facilities (i.e. System Common Services Program (SCSP) and other copy routines), callable by application programs;

2. time/volume host scheduling, terminal security, and a line oriented teletype terminal access system (i.e., System Data Communications Handler (SDCH));

3. and a more dense record storage and efficient disk accessing capability (i.e., Block Random Access Method/Hierarchical Access Method (BRAM/HAM)).

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[6]The UADPS-SP Mark I Autocoder system was converted to COBOL under Mark II. Other changes under Mark II included file-level controls of user data through file naming standards, record-level user identification for transactions, transaction/reconstruct data, user parameters via Systems Constant Areas, and true multiprogramming under the Burroughs Master Control Program.

[7]Little written information could be found on the early history of the Burroughs UADPS-SP systems. A brief history was located in the FMSO UADPS-SP Executive Handbook. The authors' summary is based upon this and upon discussions with various NAVSUP and FMSO personnel who were present at the time.

These extensions to the then commercial Burroughs medium systems software, provided UADPS-SP capabilities which were then considered "state-of-the-art" in terms of data processing, while also making the software Navy unique.

As time progressed into the 1970's, further enhancements were felt necessary in the areas of RJE support (to further permit remote sites to share the processing capabilities of stock point hosts), increased terminal and Cathode Ray Tube (CRT) terminal support, and finally, more extensive on-line terminal capabilities. Again, Burroughs and FMSO rose to the task and developed:

1. the Multiple Activity Processing System (MAPS) for the Burroughs hosts and the Satellite Access Monitor (SAM) software for remote Burroughs B1700 RJE minicomputers, replacing the earlier Multiple File Concept/COPE software;

2. modified SDCH to handle newer Burroughs CRT terminal types and increased the quantities of terminals available to the system through additional changes to SDCH and the introduction of terminal concentrators (i.e., TC3800 series) and front-end data communications processors (FEPs) (i.e., B774);

3. and modified SDCH and copy routines to permit application use of Burroughs block mode CRTs for on-line screen oriented applications.

As the UADPS-SP system continued to mature, the FMSO environmental software engineers, aided by the Burroughs Federal Systems Group, began to see that additional changes to the now thoroughly Navy unique Burroughs software, were becoming more and more complicated, more time consuming, more costly, and in some cases, had reached the architectural limits of the Burroughs medium systems using

the Navy unique software. Concurrent with this realization, NAVSUP was obtaining newer, more powerful Burroughs hosts, remotes, terminal concentrators, and terminal hardware to further relieve saturation and augment and further deploy UADPS-SP (e.g., B4800s, B874s, B1800s, B867s, CRTs, etc.).

The final straws that "broke the camel's back" in terms of making system enhancements came in the late 1970's with:

1. Burroughs host capacity saturation with little further vertical or horizonal expansion believed possible;

2. the advent of distributed interactive processing on minicomputers;

3. and the obsolescence of existing MAPS RJE processors.

The new processing requirements which developed as a result of these three events could simply not be handled by the existing systems or other Burroughs systems for which Navy contracts existed.

By the mid-1970's the Burroughs medium system hosts at the stock points were rapidly reaching capacity saturation due to a relatively constant 5-15% annual application growth rate throughout the past decade. This growth rate reflected enhancements to existing applications, the introduction of new applications, as well as a growing change in user processing methodology. Many of these new applications had passed the stage of using merely on-line, block mode processing and now required interactive communications with users. The only method to even simulate interactive

processing, which was gaining increased use in industry, on the Burroughs medium systems was to make applications memory resident and setting their job scheduling and execution parameters at their minimum values (i.e., time 0, volume 1). Such settings permitted rather rapid execution of these privileged applications, at the expense of all other on-line applications and batch processing.[8] This option could only be used selectively, due to the virtual monopolization of system resources this mode of processing required. Such use could not accommodate the interactive needs of all newly planned applications.

At the largest stock points, host configuration upgrades had reached the top of the line compatible Burroughs medium system model, the B4800,[9] and were already being used in dual-processor configurations. Therefore, vertical expansion was not believed possible. At that time also, a dual processor configuration (referred to as "2-by") was considered the maximum possible for processing efficiency.[10] Some horizontal expansion could be undertaken (i.e., the

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[8]Simultaneous on-line and batch processing at stock point sites is often accomplished today by splitting the Burroughs hosts. On-line processing is accomplished on a "primary" processor with the majority of batch processing accomplished on a "secondary" processor. Both processors share files.

[9]The introduction of the B4900 in 1984 provided a new path of vertical expansion not previously anticipated.

[10]In 1984, the Burroughs Federal Systems Group under FMSO direction also developed an efficient "3-by" B4800 configuration which was deployed at NSC Norfolk.

introduction of multiple, independent, 2-by systems) where conditioned computer room space was available and where sufficiently large applications could be isolated on these separate systems. However, the practical implementation of this approach was limited.

A further complicating factor was also at play here. NAVSUP was beginning to face questions from Navy and non-Navy oversight organizations as to why competition was not being used for these UADPS-SP hardware enhancements. Even though the initial Burroughs contract had been competitive and software compatibility issues abounded, some of these oversight organizations felt that continued granting of Delegation Procurement Authority (DPA) for these follow-on sole source procurements and contract modifications to Burroughs was questionable. Open competition was strongly encouraged. Therefore, NAVSUP was rapidly facing an "in extremis" position concerning capacity, particularly with the advent of the requirement for interactive processing, and simultaneously being "pushed" into open competition.

Since horizontal and vertical expansion within the Burroughs hosts was effectively precluded and open competition encouraged, the logical step was for NAVSUP and FMSO to look to moving additional growth and interactive oriented applications[11] off the Burroughs hosts entirely and

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[11]Nineteen application or application support areas were identified in the supporting documentation to the SPLICE Automated Data Systems (ADS) Plan.

onto other less restrictive systems which would require only minimal Burroughs interaction. The advent of the minicomputer provided the means to accomplish this.

The minicomputer revolution brought the ability for the Navy to competitively acquire numerous, relatively cheap hardware suites from multiple vendors, along with software that could significantly reduce application development time. This approach had already been used by several System Commands,[12] who used FMSO as their CDA on a project basis, and who had obtained Interdata (ID) 7/32 minicomputer hardware and software for their new projects.

On the positive side, this approach was seen by NAVSUP as an interim solution to both the capacity and interactive processing problems discussed above. On the negative side, however, each additional brand of minicomputer obtained would require access to the rapidly saturating Burroughs hosts on both a process and terminal transaction (e.g., pass-through to the Burroughs) basis. Additionally, these new hardware suites often supported vendor unique terminal types and non-Burroughs compatible data communications packages. The possibly of having to uniquely interface a large number of "foreign hosts" to the Burroughs hosts via ever growing data communications changes in SDCH appeared

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[12]Examples are NAVSEASYSCOM with the TRIDENT LOGISTICS Data System (TRIDENT LDS), NAVAIRSYSCOM with the Naval Air Logistics Command Information System (NALCOMIS) and the Comptroller of the Navy (NAVCOMPT) with the Integrated Disbursing and Accounting systems (IDA).

prohibitive, regardless of the capacity relief provided by these new minicomputers.

It was at this time in December 1977 that the "Spaghetti Bowl" pitch was made to NAVSUP at FMSO. This pitch highlighted the above mentioned problems, with particular emphasis on the difficultly involved in interfacing many brands of minicomputers to the Burroughs. This meeting also provided a recommendation for resolution: SPLICE.

It was proposed that a SPLICE project should be undertaken to provide a standard hardware and software minicomputer system for all new UADPS-SP interactive application systems. This standard system would be interfaced via land line, data communications to the Burroughs hosts. Since this system would be used by all new NAVSUP approved applications requiring interactive processing, only one additional minicomputer data communications (i.e., SDCH) interface would be required. The overhead which this additional interface might cause would be off-set by moving Burroughs terminals and downloading many of the terminal oriented SDCH functions to SPLICE, providing some Burroughs capacity relief. Additional capacity relief could also be provided if existing Burroughs mainframe applications would download their on-line transaction edit and validation functions to the SPLICE minicomputers. Finally, it was proposed that a functionally equivalent form of MAPS SAM software be ported

to SPLICE, and when completed, use SPLICE systems to solve the obsolescence problem of the existing Burroughs B1700 MAPS RJE processors.

This proposal potentially resolved the majority of NAVSUP's recognized saturation, interactive processing, and obsolete equipment problems, on an interim basis, until the follow-on SPAR project could be undertaken. The only remaining issue was for which minicomputer hardware and software to solicit. This, too, was resolved at the December meeting. FMSO's current investment in ID 7/32 software development, both application oriented (using TAPS) and environmental (which developed into TRIDENT Network Control Processor (NCP) and Integrated Network Software (INS) for Burroughs-ID access) essentially resolved the issue. SPLICE would be developed and deployed on ID 7/32 hardware, obtained via a brandname or equal procurement. FMSO would standardize UADPS-SP and related minicomputer application development on this hardware using TAPS and develop additionally required environmental and MAPS RJE Burroughs data communications interfaces. Thus, any minicomputer application currently under design or planned by NAVSUP and FMSO could be designed for and developed immediately on existing ID 7/32 hardware, later transitioned to SPLICE, and be deployed with little or no modifications.

Following several contractor studies on the proposal and a meeting with Naval Data Automation Command (NAVDAC)

representatives to discuss the initiative, the SPLICE project was formally announced on 14 July 1978 [Ref. 13]. Then, NAVSUP "moved out smartly" to execute SPLICE, anticipating a short hardware acquisition and software development time window.[13] Steps taken included assignment of a NAVSUP project officer, formal tasking to FMSO for further concept design [Ref. 14], assuming use of ID hardware and TAPS, and the preparation of an agency procurement request (APR)/granting of DPA for the acquisition of 50 ID 7/32 minicomputers [Ref. 15]. From all indications, it appeared to NAVSUP that SPLICE would be available for deployment by mid 1979, prior to completion of tentative applications.

C. PROJECT EVOLUTION

By December 1978, these original SPLICE plans fell under close re-evaluation. Numerous factors necessitated this:

1. Although significant price advantages were available in minicomputer Central Processing Units (CPUs), these advantages did not extend to peripherals such as disks, tape drives, and printers. The need to share high cost peripherals in collocated systems was recognized.

2. Many of the peripherals on the Burroughs hosts themselves required replacement and had top priority. There would be significant cost savings if Burroughs peripherals (e.g., CRTs) could be shared, to some extent, from SPLICE.

3. Advances in local and long-haul telecommunications were taking place in industry and within the

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[13] The short software development window was not concurred with by FMSO.

Department of Defense (DOD). These included advanced terminal and host protocols, new more powerful terminals, and AUTODIN II.[14] UADPS-SP, even with SPLICE implemented on the ID 7/32s, could not take advantage of these.

4. Land line data communications among collocated processors was relatively slow and appeared unable to meet all the new applications response time and throughput requirements. High speed inter-computer communications on incompatible systems was now possible [Ref. 16] and, if implemented successfully, could serve as a SPAR transition strategy.

5. The ID 7/32s proved not to be the "savior" as once envisioned. Memory limitations (i.e., 1 MEG), lack of system expandability to meet surge or mobilization requirements, and limitations on the number of terminals which could be supported were evidenced even in the FMSO development arena. These limitations, when extrapolated to operational sites, indicated an inability to handle peak processing loads. Worse then that, hardware and software reliability of these systems was low and seen as unable to support "up-time" requirements of the new interactive and CRT oriented applications.[15]

6. The estimated number and sizes of planned applications along with an emerging requirement to expand the number of MAPS RJE sites could not be met with a mere 50 ID 7/32 minicomputers.

The combined effect of these factors lead the NAVSUP and FMSO SPLICE personnel to conclude that the original plans for SPLICE would not produce a system which could meet the needs of UADPS-SP through even the 1980s. It was necessary for SPLICE to change to accommodate these new requirements.

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[14]AUTODIN II was subsequently replaced by the DDN. SPLICE support for DDN was later required due to this replacement.

[15]The use of "hot" stand-bys by TRIDENT LDS and processor upgrades to larger PE minicomputers in other applications temporarily reduced the short-run impact of these events, but could not resolve them.

By May of 1979, NAVSUP cancelled the original SPLICE design tasking to FMSO in favor of a competitive procurement for "fault-tolerant", modular, expandable, interactive processing, and communications oriented system hardware and software, which included an AUTODIN II interface as well as a high speed local computer network (LCN). The size of the acquisition also increased from 50 processing systems to "2 to 6 processor systems" per site, at 62 sites, orderable totally on a requirements basis. In February 1980, the NAVSUP request for DPA for the ID 7/32s was formally withdrawn [Ref. 17].

Although the NAVSUP and FMSO SPLICE project teams attempted to recover from the time loss incurred due to this change of direction, other environmental factors worked against them. Only a brief summary of these factors is presented below. A complete documentary history of these is available in [Ref. 18].

New requirements for ADP project management and control resulted in a lengthy ADS Plan development cycle with an equally long approval process. A new APR had to be generated, which was challenged at the NAVDAC level and subsequently modified to cover the eventual replacement of all MAPS RJE equipment and Burroughs B774/874 front-end processors. Funding profiles were dramatically changed due to the additional hardware requirements. A draft competitive solicitation document had to be prepared as

required by the Automated Data Processing Selection Office (ADPSO). Application processing profiles and workload data had to be collected in support of site sizing and benchmarking efforts. In the middle of all this, the project was required to transition to Life Cycle Management (LCM) control, resulting in further delays due to documentation changes, reviews, and new approvals.

The net effect of all these changes was a delay of over 27 months for the SPLICE project (to April 1981), just to get a Source Selection Evaluation Board established [Ref. 19], so that an active competitive procurement could be undertaken. The competitive procurement process itself took an additional 19 months, and finally resulted in the contract with FDC for TANDEM Non-Stop TXP systems, Network Systems Corporation HYPERchannel products, and associated system software and support on 17 November 1983.

D. SPLICE DESIGN

As might be expected during the 46 months from the decision to openly compete for SPLICE to contract award UADPS-SP hardware, the stock point application mix to be supported, the specific system support requirements, and the FMSO environmental designs continually changed. UADPS-SP could simply not wait for SPLICE, and SPLICE was required to accommodate all changes.

New hardware continued to be added to UADPS-SP in an attempt to overcome immediate processing shortcomings and

project requirements. Additional B4800s were added to the inventory at larger sites under an interim CPU upgrade project, replacing earlier models which were reallocated to smaller sites. Starting in 1985, B4900 hosts were also added, following an 18 month planning effort. A Peripheral Replacement Project replaced older Burroughs disk, tape, and printer units. This same procurement vehicle obtained more modern Burroughs terminal concentrators (i.e., CP9400s and CP9500s). Leases and buys of B1900 minicomputers replaced older B1700 and B1800 systems. New Burroughs and compatible terminals (e.g., MT980 series, Delta Datas, etc.) and printers, as well as microcomputers were added at sites in large numbers. Many Perkin-Elmer (PE) 3200 series hosts replaced older ID 7/32 systems. And finally, the Naval Integrated Storage and Retrieval System (NISTARS) project had required that an interface of TANDEM Non-Stop IIs to the Burroughs system be developed. SPLICE now had to also accommodate these changes.

All four of the applications which were to have been totally application resident on SPLICE had been developed and deployed on other hardware.[16] The remaining 15

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[16]IDA and the Navy Automated Documentation System (NAVADS) were successfully developed and deployed on PE hardware using TAPS. The Automation of Procurement and Accounting Data Entry System (APADE) had been developed and prototyped, but was not deployed in its PE form. The Receipt Improvement Program (RIP), renamed Application B Enhanced (ABE), had been successfully developed and deployed on Burroughs terminal concentrators with some core resident applications on the Burroughs hosts.

applications which SPLICE was to support on a pass-through basis to Burroughs or for edit and validation purposes had either been developed and deployed on Burroughs or ID equipment, deferred indefinitely, or were cancelled.[17] Although SPLICE was still required to function as a base from which to develop other new applications or the functional transition of any existing Burroughs application or part thereof, there were now no immediate applications in waiting for SPLICE.

With the completed implementation of many of the original applications SPLICE had planned to support, there appeared to be little urgency, from an application point of view, to move existing terminal processing to SPLICE.[18] SPLICE project personnel felt, therefore, that system support requirements should be migrated from an emphasis on deployment and usage services for the original 19 applications to an emphasis on generalized communications services[19] for any application and for projected stock point terminal additions. This change in emphasis was pursued but

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[17]Transportation Operational Personal Property Standard System (TOPS).

[18]The exception being Transaction Ledger On Disk (TLOD).

[19]These generalized communications requirements included: support for every terminal type used within the NAVSUP community; local computer network interfaces to Burroughs, IBM, PE, TANDEM, and Univac; data communications interfaces to IBM hosts; DDN interface for interoperability; inter-SPLICE networking capabilities; and horizontal and vertical logistics system connectivity, exclusive of DDN.

resulted in SPLICE having to provide its own initial environmental capacity off-load from the Burroughs to make up for the initial additional workload that the LCN interface would add to the Burroughs, assuming few Burroughs terminals from the existing inventory would be moved to SPLICE on day one. Therefore, a plan was developed that would permit the off-load of the Burroughs TRANSRECON (journal facility) to SPLICE using the LCN to provide initial capacity relief.

With the journal facility available on SPLICE, a means was now present to replicate Burroughs master files on SPLICE and keep them current on-line, once initial file loads were accomplished. Assuming this facility was available, new applications were then identified [Ref. 20] that could use these replicated files on an immediate inquiry basis and for ad hoc batch reports, relieving up to 2 hours of processing time a day on the Burroughs hosts.[20] The transitioning of Burroughs End-of-Day application processing to SPLICE also became a possibility, providing the potential for even further Burroughs capacity relief. With the potential for significant Burroughs capacity

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[20]To meet this requirement, the SPLICE Information Center concept was born. This Information Center capability revived interest in moving other Burroughs terminals to SPLICE. With this capability, a single terminal could access Replicated Files on SPLICE very rapidly, or use "pass-thru" facilities on SPLICE to access non-replicated Burroughs files or programs.

paybacks, this group of "download projects" was then added to the SPLICE requirements list [Ref. 21].

The SPLICE long-term commitments to the originally planned, four wholly resident applications also remained intact. Although these applications had been developed and deployed on other hardware, the limitations that had necessitated SPLICE's change in direction in 1979 were adversely effecting them now. These applications required a "transparent" transition vehicle to SPLICE. This was to be accomplished through the porting of TAPS to SPLICE.[21] One addition, however, was added to SPLICE support requirements in this arena. A text processing capability was emerging as a requirement for the under redesign APADE application.

The original FMSO SPLICE environmental designs remained in a state of flux by trying to keep up with the moving SPLICE "target." As previously indicated, the original designs for SPLICE on the ID 7/32 were abandoned. The competitive solicitation process and the six month window mandated for completion of initial SPLICE capabilities after contract award required that design and development be undertaken without specifically knowing the target hardware or software. This was a particular problem on the environmental interface software side, as "hooks" into the procured "off-the-shelf" environmental software would be

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[21]A similar porting of TAPS had been accomplished by the Army for the VIABLE project.

required. Generic functional and system designs were developed, in a phased approach, and continually modified as requirements changed.[22]

To accommodate the numerous SPLICE requirements, the project was split into phases. The phases of SPLICE finally solidified as follows [Ref. 22]:

1. In the first phase of the development, SPLICE hardware/software systems were to provide enhanced interactive processing for stock point systems using either the procured Transaction Processing Systems (TPS) or TAPS. Selected UADPS-SP applications were to migrate to the SPLICE hardware for partial or total processing support depending on the application, interactive requirements, processing sites and funding availability. Processing was to take place along the local SPLICE multi-vendor terminal and LCN networks, thereby beginning possible reduction of telecommunications workloads on the non-SPLICE computers and permitting shareable resources. A basic interface to the DDN would also be provided.

2. In the second phase of SPLICE implementation of RJE processing improvements were to be developed on SPLICE nodes and made available to the remote stock point locations. Software enhancements and SPLICE hardware/software configurations were to improve and expand remote processing methods.

3. The third phase of the SPLICE project was to establish a fully interoperable network capability under SPLICE using the DDN service protocols.[23]

4. In the final and fourth phase, the LCN interfaces were to be expanded to support other host systems and to provide the framework for SPAR.

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[22]During this period, the SPLICE Requirements Statement was modified twice, and the SPLICE Functional Description and System Specifications were each modified three times.

[23]This, along with additional non-DDN functionality, is currently called SPLICENet.

At the end of these phases, a SPLICE configuration would provide, at a minimum, support of the following stock point ADP or telecommunications functions:

1. Conversational (interactive) program support, including text processing;

2. Remote job entry services (including remote input/output queue management);

3. Queued support of transaction input/output terminals;

4. Operating system, process and file Integrity for high system availability;

5. Non-disruptive reconfiguration/expansion;

6. Location independent process-to-process communications;

7. Modular expansion of hardware and software;

8. Local screen management support for local display terminals connected to remote processes;

9. User and process routing in support of a distributed transaction processing environment.

D. SPLICE DEVELOPMENT

Actual SPLICE Phase I prototype interface software development based on FMSO design documents began in the summer of 1981. This prototype software was written in PASCAL[24] and developed on a pair of interconnected PE 3244s. Its purpose was to test design concepts and reduce the learning curve when the final target system was identified. Similar efforts were undertaken using a R&D funded HYPERchannel system. Although it had been hoped that

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[24]This language was selected for portability.

software developed from these efforts would be ported to the final SPLICE hardware, in the final analysis, it only served to assist in identifying problems and shaking out the design. No software was deployed from these initiatives.

FMSO SPLICE software design and development resources were used extensively during this time on the solicitation effort, particularly in the benchmarking and operational test areas. This dual use of resources (development and solicitation) reduced the development output of the FMSO SPLICE team, but resulted in an early familarity with the potential hardware and software and, thus, reduced the development learning curve.

It was not until late within the procurement process (in June 1983 when only two offerors remained, both proposing TANDEM and HYPERchannel products) that TANDEM based SPLICE development commenced in earnest. The first commercial TANDEM training was obtained at this point in identified off-the-shelf software products, to further reduce environmental and application development lead time once the contract was awarded. Following training, live development work began on the SPLICE environment software (i.e., Burroughs Pre-Processor, the File Replication software, and the Navy interfaces to HYPERchannel).

Since TANDEM did not corporately support PASCAL at that time, two contractual software development efforts were required. The first was undertaken to develop a TANDEM

based PASCAL compiler, so that TAPS, recently re-written in PASCAL on a PRIME host and renamed TAPS II, could be ported to the new hardware in order to reduce the transition time of two of the four original SPLICE resident applications [Ref. 23]. Additionally, contractual efforts for the porting of TAPS II itself to SPLICE were completed [Ref. 24].

When the SPLICE acquisition contact was signed in November 1983, SPLICE Phase I development was in full production mode on the environment side and in training mode on the application side. FDC entered the picture at this point, providing on-site FMSO support, additional training, and completing their Security Access System (SAS), System Monitor (SMON), and universal terminal/printer interface mapping (TMAP) software. When the Burroughs HYPERchannel software package (i.e., Burroughs NETEX) provided from the contract failed to perform in an operational environment, FDC also provided assistance to FMSO in development of a local TANDEM-to-Burroughs (TABU) HYPERchannel software package. Similar FDC assistance was provided to the initial SPLICE developing applications: Transaction Ledger on Disk and Replicated File Inquiries.[25] Concurrently, contractor development was underway on the Inventory Location Audit Program application.

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[25]These applications used the TANDEM native mode transaction processing system, PATHWAY. TAPS was reserved solely for the transition of IDA and NAVADS.

All development work for the Phase I SPLICE prototype site, Naval Regional Data Automation Command (NARDAC) Jacksonville, supporting Naval Supply Center (NSC) Jacksonville, was completed in the late summer of 1984. Implementation of Phase I of SPLICE at this site, including the initial applications, was completed on 2 November 1984. This successful prototype permitted the SPLICE project to submit their System Decision Paper III (SDP III) document for system approval and thus receive authority for subsequent system deployment, including follow-on development phases, capabilities, and additional applications [Ref. 25].

The SPLICE project is in the process of implementing Phase I throughout the stock point community. Concurrently, work is underway for subsequent phases and applications. From this rather lengthy background chapter, it should be clear that the SPLICE project has grown significantly over the years in both size and potential to meet the ever changing needs of the NAVSUP stock point environment. With this background established, it is now possible to see how the current and projected SPLICE capabilities listed at the beginning of this chapter can be used to facilitate overall NAVSUP corporate plans, through revised SPLICE project plans.

III. PROPOSED SPLICE PROJECT PLANS

A. CHAPTER OVERVIEW

In the introduction to this document, definitions were provided for the terms goals, strategies, and objectives. For emphasis purposes, they are reproduced here:

1. Goals - long terms results that an organization wishes to achieve.

2. Strategies - means to accomplish goals by providing corporate direction and intent.

3. Objectives - immediate short run actions which implement strategies and which should be supported by tactical initiatives.

How these terms apply to SPLICE planning is the next area which will be discussed.

The SPLICE SDP III document is the current published source of SPLICE project plans. Its orientation and format is dictated by LCM guidelines [Ref. 26]. Since the SPLICE SDP III documentation pre-dates both the NAVSUP Strategic and Strategic Information System plans, its format is not directly comparable to the latter documents. For example, the SPLICE SDP III document uses a hierarchy of concepts, capabilities, and what are called "objectives" to describe what are termed goals and strategies in the latter plans, and uses Plans of Action and Milestones (POA&Ms) to describe both other immediate objectives, similar to those in the latter plans, as well as tactical plans.

Prior to proposing changes to SPLICE plans to bring them into consonance with the NAVSUP Strategic and Strategic Information System plans and terminology, it is appropriate to present the existing project plans for comparison and analysis purposes. To accomplish this a reorganization and interpretation of some information in the SPLICE SDP III document is required, particularly in the area of terminology. The following paragraphs will provide the basis for this and then propose revisions.

B. PROPOSED SPLICE PROJECT GOALS

The goals of the SPLICE project, termed key objectives in the SPLICE SDP III, are promulgated as follows [Ref. 27]:

1. Provide a nucleus for supporting all current and future logistics data communications requirements by consolidating local and long distance communications into a single integrated network using the DDN as a backbone;

2. Provide state-of-the-art interactive transaction and distributed processing capabilities to alleviate the saturation of the installed computer base;

3. Provide economic system support and standardization of computer suites by providing a general purpose computer system to curtail the proliferation of incompatible minicomputers at UADPS-SP host and remote sites.

In comparing these goals with those of the NAVSUP Strategic Information Systems Plan presented earlier in this document, one major difference becomes apparent. The existing SPLICE goals tend to deal more with specific stock point environmental ADP issues than long term logistics system results or benefits that could accrue to the NAVSUP

corporation as a whole. This is not, in and of itself, a problem in that the SPLICE document preceded the other two, but it is now inconsistent with the format and design of the senior level planning documents. In addition, however, the goals themselves appear as either not accomplishable or backward looking, in the opinion of the authors. The following paragraphs will elaborate on this contention.

The first goal appears not accomplishable from several aspects, if one takes the word "all" literally. First, SPLICE has an impact only on a portion of stock point logistics data communications requirements, when one includes the NAVDAC supported stock points and emerging NAVCOMPT financial stock point related systems. The NARDAC and Naval Data Automation Facilities (NARDAF) activities, though their sponsor NAVDAC, are pursuing their own Univac U1100 DDN interface [Ref. 28], their own local networking initiatives, and have never approved the SPLICE LCN interface to their Univac hosts [Ref. 29]. The NAVCOMPT IDAFIPS system also includes its own DDN interface [Ref. 30], its own interim host-to-host networking initiative using Burroughs Network Architecture [Ref. 31], and was never planned to interface to the SPLICE LCN. Additionally, SPLICE itself must support non-DDN based logistic data communications requirements for Defense Logistics Agency access and interface to a separate NAVSUP sponsored Inventory Control Point (ICP) local and long-haul data

communications network, ICPNet [Ref. 32]. For these reasons, this goal of SPLICE providing the nucleus for "all" current and future stock point communications requirements appears to the authors as not accomplishable.

Moving to the second goal, it appears to the authors as backward looking, or describing already completed events. Specifically, this goal appears to have been already accomplished by two events, with a third event providing a long term resolution. First, much of the immediate saturation problem at the stock points appears to have been resolved by the delivery of the Burroughs B4900s to the stock points [Ref. 33]. Second, the signing of the SPLICE contract itself, with subsequent system deployment, provided the processing capabilities stated within this goal. Additionally, it is in the already completed and on-going deployment of SPLICE resident applications that additional potential short-run saturation problems can be avoided. The third event, the SPAR project which will shortly be awarding its own long-term hardware and software contract for the stock points, is itself predicated on long-term saturation avoidance [Ref. 34]. In light of these accomplished or near term events, this goal of providing processing capabilities to relieve stock point host saturation appears out of date, in that it has been accomplished, and is no longer applicable.

Finally, the third goal appears as both not accomplishable and backward looking. It is not accomplishable due to a source outside of NAVSUP control: NAVCOMPT. As NAVSUP moves to eliminate non-TANDEM minicomputers from the stock points, NAVCOMPT, particularly with its PE 3210 based NAVSCIPS project [Ref. 35], will move a small number of more recent vintage PEs back in.[26] It is felt that this goal is backward looking in that the proliferation of NAVSUP controlled non-Burroughs compatible minicomputers at stock points appears to have ceased with the deployment of SPLICE. Therefore, this goal too becomes questionable.

In light of the above, it appears that a new set of goals for the SPLICE project is necessary. The following goals are proposed based on the NAVSUP Strategic Information System Plan and the capabilities available within the SPLICE project as outlined in Chapter 2 of this document:

1. Assure that SPLICE fully supports the Material Requirements Determination Program, provides improved fleet support, and assists in weapons system logistics support requirements by providing system capacity for applications, a comprehensive set of local and

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[26]It should also be noted that at some stock points the Defense Communications Agency (DCA) will be installing DDN Interface Message Processors (IMPs) of the BBN C30 series. This adds yet another additional "minicomputer" to the stock point environment, even though they will not be specifically responsible for it.

longhaul data communications capabilities, and office automation/management support tools. (NSISP[27] Goal 1)

2. Assure that SPLICE fully participates in the NAVSUP Information Resources Management Program including data administration, so that information is managed as a NAVSUP corporate resource. (NSISP Goal 2)

3. Assure that on-going and future SPLICE initiatives provide security, data accuracy, maximum modularity and flexibility, maximum integration, and a timely return on investment. (NSISP Goal 3)

4. Assure that SPLICE project efforts result in improved user effectiveness, increased productivity, and better use of Navy resources. (NSISP Goal 4)

5. Ensure SUP 0472 develops and maintains comprehensive SPLICE strategic and tactical plans, performs effective budgeting, and efficiently manages its assets consistent with the overall NAVSUP mission and goals. (NSISP Goal 6)

6. Assure that SPLICE effectively exploits new and emerging information system technology. (NSISP Goal 7)

As can be seen, these proposed goals are directly relatable to NAVSUP Strategic Information System goals and, as will be demonstrated in latter chapters, are supportable from existing, planned, or potential SPLICE and application project capabilities. With these goals so proposed, the area of SPLICE strategies can next be addressed.

C. PROPOSED SPLICE PROJECT STRATEGIES

The SPLICE project has specified in its SDP III document 32 project strategies, broken down into support, design and economic areas, which also happen to be termed "objectives"

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[27]Each proposed SPLICE goal is cross-referenced to the senior level plan by this notation. NSISP will be used as an abbreviation for the NAVSUP Strategic Information System Plan.

[Ref. 36]. Due to their length, they have been reproduced as Attachment E.

Although these strategies are not directly related to the later strategies produced in the NAVSUP Strategic and Strategic Information System plans, they appear to be comprehensive and well presented.[28] The major problems that become evident from these strategies are twofold. First, of the 32 presented, 14 are considered to be complete since they are either acquisition related or have been accomplish through SPLICE Phase I. Those considered complete are indicated by an asterisks next to the strategy number in Attachment E. Second, at least three of the remaining strategies appear as duplicates or variations on previously presented strategies (i.e., number 20 is a variation on number 10 and numbers 21 and 32 are variations on number 3).

Using the remaining strategies, the NAVSUP Strategic Information System Plan, and the SPLICE capabilities outlined in Chapter 2 as a basis, a revised set of SPLICE project strategies has been prepared. Again do to their length, the new strategies are provided as Attachment F, instead of being presented here. As can be seen, these proposed strategies are directly related to both NAVSUP Strategic Information System Plan strategies and to the proposed SPLICE project goals presented earlier. As such,

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[28] More importantly, they were sufficient to obtain SDP III approval.

they should "fit" better under the NAVSUP corporate planning umbrella, resulting in greater impact and planning cohesiveness.

Having now proposed a new set of SPLICE project goals and strategies, both directly related to the NAVSUP Strategic Information System plan, the area of supporting objectives may now be addressed.

D. PROPOSED SPLICE PROJECT OBJECTIVES

The final area of SPLICE planning that must be discussed is that of objectives. From the analysis point of view, this is the most difficult area to address because what has been defined as objectives within this document and in the senior level NAVSUP planning documents, is presented within the SPLICE project supporting documentation and SDP III document by a long series of POA&Ms [Ref. 37]. For example, the NAVSUP SPLICE project office periodically issues a SPLICE Milestone Plan and Status Report. Within this document are 16 separate POA&Ms covering all the project management, hardware, and environmental software areas. Environmental software areas are further delineated by FMSO maintained POA&Ms. However, the SPLICE project office is not directly responsible for SPLICE applications nor for NAVSUP wide telecommunications. Therefore, many additional POA&Ms from other codes within NAVSUP must be reviewed for SPLICE application objectives, also supported by more detailed FMSO documents, and still others for NAVSUP

telecommunications objectives, which do not appear to have corresponding FMSO documents.

Little purpose would be served by reproducing these many documents as appendices to this work or attempting to summarize them here. An alternative approach was selected wherein the authors reviewed these documents, discussing portions with applicable project managers, and selected key milestones to be incorporated into a master list of SPLICE project objectives. The proposed master list is provided as Attachment G to this document.

In reviewing Attachment G, several points should be noted. First, an attempt was made to include objectives for every major area in which the SPLICE project is currently or projected to be working in, along with several additional areas being recommended by the authors for adoption as official SPLICE objectives. Secondly, each objective is cross-referenced to both applicable SPLICE strategies and NAVSUP Strategic Information System Plan objectives. Finally, estimated completion dates have been proposed, but since limited contact with the affected field activities was possible during the time allowed for this work, these dates must be considered "soft" and will require further inputs prior to actual adoption.

Having proposed new SPLICE project goals, strategies, and objectives, the areas of supporting tactical initiatives and programs can now be addressed in the next five chapters.

IV. CENTRALLY MANAGED SPLICE SUPPLY APPLICATIONS

A. CHAPTER OVERVIEW

Two major categories of application programs exist at the Navy stock points: FMSO centrally designed and developed applications and locally designed and developed applications. Within these categories, six major functional application areas exist: physical distribution, inventory management, stock point management, procurement/contracting, financial services, and stock point services.

In this chapter, centrally developed SPLICE supply applications in the first three areas will be addressed from several aspects. First, proposed, in design, and already developed SPLICE supply applications will be presented in terms of their purpose, including their defined corporate support and benefit area(s) or potential for increased corporate support and benefit. Secondly, these applications will be analyzed in terms of their need and potential for migration to the SPAR Project. Finally, it will be shown how each application tactically supports or can be made to better support the proposed SPLICE objectives.

While performing this last effort, recommendations will be made for changes to these tactical or application programs to enable them to provide greater support or benefit to the "NAVSUP corporation." These recommendations

will tend to focus more on the data processing or information system areas rather than on the functional areas. This is necessary because the authors are not, and do not wish to imply that they are, qualified systems analysts in any of the functional areas which SPLICE addresses, but do understand the basic business processes.

With this preview in mind, the presentation of SPLICE physical distribution, inventory management, and stock point management application areas will next be undertaken.

B. SPLICE APPLICATION "B" ENHANCED (ABE)

Material receiving within UADPS-SP falls under the physical distribution functional area. The receiving portion of physical distribution is guided by a two cycle recording concept called "controlled post." This concept requires in cycle number 1, the "in-process" cycle, that receipt of material at an activity be recorded in an In-Process field of a mechanized Master Stock Item Record (MSIR) and can even be reported as received to the applicable Inventory Manager. However, this initial receipt cycle does not increase the on-hand balance of the activity record. The receipt is then tracked through cycle number 2, the "stow" cycle, which concludes with physical storage and generation of a transaction that updates the MSIR on-hand quantity, after positive confirmation of stowage.

Application B is the UADPS-SP receipt processing application. Included within this application are programs which perform the following functions [Ref. 38]:

1. establish, maintain, modify, inquire, and purge due records on the Receipt Due File (RDF) to the Receipt Due History File (RDH), providing financial data updates as required;

2. follow-up or cancel overage dues;

3. record data on the physical receipt of material in the RDF and the MSIR, direct material to the appropriate locations, notify Application C to release issues held in the In-Process/Backorder file, generate financial information to applications E and F, and generate transaction item reports (TIRs) through Application H.

4. determine disposition of Material Turned into Stores (MTIS), including generation of transactions for excessing material through Application M, taking material into stock, or disposing of material, as required.

5. generate management reports including statistical reports on delinquent dues, receipt processing timeframes, and performance of sources of supply.

Prior to October 1982, all of these functions were performed at UADPS-SP stock points primarily via Burroughs COBOL programs on the Burroughs medium system mainframes, using remote card reader/punch equipment, card inputs and outputs, and hard copy documents and listings. A simplified example receipt transaction will help explain this process:

1. physical receipt of material occurs on the receiving floor;

2. documentation is carried to some receipt control area where information is transcribed from the receipt document to a punch card for input/inquiry to the site RDF via remote Burroughs card reader/punch equipment;

3. responses are returned in card format, including a receipt detail card, and a stow card with possible trailer information;

4. the receipt detail reply cards are matched to the original receipt document and input to update applicable fields (e.g., In-process) on the RDF and MSIR; exceptions are returned, corrected and re-input;

5. stow cards are attached to the material while on its way to the location;

6. when the material is physically stored, the stow card is re-input to update the RDF and MSIR.

Similar processes are required for receipts not from due, contract receipts, and MTIS. As may be imagined, this card-oriented and paper-intensive process was time consuming, error-prone, and not conducive to complete asset visibility nor management control and oversight.

For these reasons, receipt processing had been identified as one of the earliest potential benefactors from SPLICE on-line processing. As such, NAVSUP designated the Receipt Improvement Program (RIP) as one of the first and foremost SPLICE applications.

The benefits to the corporation from such a program included better asset visibility; improved asset control; reduction is inventory costs due to lost, erroneously processed, or stored receipts; increased receiving clerk productivity; improved fleet support by having material available for issue faster; and elimination of obsolete card oriented hardware. When the delay in acquiring SPLICE hardware occurred, RIP was one of the applications that simply could not wait; the payoffs were too great to be

postponed. The result was the creation by FMSO of Non-SPLICE ABE.

Non-SPLICE ABE, implemented partially through new and revised core-resident Burroughs application programs, a new Receipt Control File (RCF), and using Burroughs terminal concentrators and terminals, eliminated much of the card processing. This was accomplished by segmenting and modernizing the user interface portions of the receipt process, as well as providing a NISTARS interface. Specifically, FMSO provided the capability to eliminate inquiry, receipt detail, stow, exception, and trailer cards from receipt processing and replace them with CRT inputs, displays, and printer outputs. A simplified, sample receipt within non-SPLICE ABE might process as follows [Ref. 39]:

1. when material is received, a CRT inquiry is made to a Burroughs resident file to determine the status of this material (e.g., is it on order, recorded as such, etc.). This inquiry results in the computer assignment of a 5 position Receipt Control Number (RCN) to this transaction and the creation of a new receipt control record in the Burroughs resident RCF file, using the RCN as the key. Both the Burroughs MSIR and RDF files are accessed for data and selected fields are brought to the screen and transmitted to the RCF.

2. any exceptions to normal processing are output to the CRT screen for immediate correction and re-entry, or to a designated exception printer. Thus, exceptions may be worked prior to the receipt being placed in-process within Non-SPLICE ABE and exception visibility maintained anywhere within the receiving process.

3. assuming the material is on-order, a stocked item, and has been pre-assigned a warehouse storage location, a CRT display Receipt Detail Transaction is output which contains the RCN. Receipt Detail transactions may be further processed from the CRT to begin "cycle 1."

These are edited and validated prior to being forwarded to normal receipt updating programs. A hard copy Material Movement Document (MMD) is also printed and attached to the material to assist in storage.

4. all follow-up receipt actions for this transaction may then be taken and recorded via other CRT screens. The Burroughs RCF record is continually available for inquiry or update by adjustment transactions to record the latest action against the received material, as well as NISTARS interface transactions.

5. following completion of storage, one of several CRT stow frames may be used to confirm the storage action and initiate cycle 2 final update of the Burroughs MSIR and RDF files.

In addition, the implementation of Non-SPLICE ABE provided increased information about the status of the receiving operation: the receipt clerks could obtain individual receipt information status at the touch of a button and management received new visibility of the entire site receiving process via hardcopy reports providing detailed status of non-completed receipts through the RCF file.

The implementation of Non-SPLICE ABE has been successfully completed at many UADPS-SP stock points to date. Although successful, Non-SPLICE ABE has encountered problems:

1. Burroughs Host dependence - This has resulted in two problems:

   a. when the Burroughs is down, receiving, shortly thereafter, stops. Although this can be tolerated for short periods of time, lack of receiving lay-down space at many activities and lost worker productivity during this time will not permit this situation for long.

   b. low response time and high overhead processing requirements. To achieve an acceptable level of terminal response, some Non-SPLICE ABE programs

must be made core-resident with scheduling and execution parameters set at time 0/volume 1. At a high volume activity, this can adversely affect other processing. Also, even with this privileged processing status, response times may be relatively long.

2. lack of Burroughs hardware availability. Non-SPLICE ABE requires additional Burroughs hardware (i.e., memory, some disk, and terminal concentrators) that is not immediately available on NAVSUP contracts or that would only be necessary until SPLICE. This latter situation makes justification for this hardware very difficult.

3. inflexibility of management reports. Although the new Non-SPLICE ABE management reports provided a great deal of new management information, there was only limited capability for management to perform "ad hoc" reporting, in user designated formats.

To resolve these lingering problems, NAVSUP directed that a SPLICE ABE be developed for eventual implementation by all stock points [Ref. 40].[29]

The concept behind SPLICE ABE was simple: take the best from the successful Non-SPLICE ABE implementation and move it to SPLICE TANDEM hardware to:

1. provide for "non-stop" receiving for regular and contract receipts by severing immediate receiving dependence from the Burroughs hosts;

2. provide some capacity relief to the Burroughs by moving six Non-SPLICE ABE programs, the RCF (called the RKF on SPLICE), and the receiving terminals and printers to SPLICE. Additional Burroughs capacity relief would also be provided by directing MSIR and RDF read-only data requirements to the SPLICE Replicated Files vice the Burroughs MSIR and RDF.

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[29]There are currently three versions of receipt processing in place: the original card oriented version, Non-SPLICE ABE, and SPLICE ABE. Current NAVSUP direction appears to be that the non-ABE version of receiving will not be supported after 1 June 1987 and SPLICE ABE will become the only supported version sometime after 1987.

3. further decrease receipt processing times by reducing CRT response and document preparation times when using the more on-line and inquiry oriented TANDEM systems;

4. provide the user the capability to generate non-standard or ad hoc reports via TANDEM's ENFORM product, supplementing FMSO provided management reports.

5. permit the use of secondary keys on SPLICE resident files.

Complete information on the SPLICE ABE design is available in [Ref. 41].

The processing scenario for a regular receipt under SPLICE ABE appears similar to that described for a Non-SPLICE ABE receipt transaction, once the host and file substitutions described above are made and the SPLICE HYPERchannel interface to the Burroughs is substituted for the terminal concentrator and Burroughs FEP data communications link. A critical difference is that in SPLICE ABE, the receiving terminals, the RCF, and the CRT user interface processes are running "non-stop" on the SPLICE TANDEM hosts, sending/receiving transactions to/from the Burroughs to complete transactions and update master files. In the event of Burroughs failure, receiving can continue with all transactions destined for the Burroughs queued up on SPLICE and awaiting for the Burroughs' return to an on-line status.

Concerning the second area of application analysis stated in the overview of this chapter, the SPLICE ABE

application can be now analyzed in terms of its need and potential for migration to the SPAR Project. In reference to the need for migration of the function, that goes without saying, in that receiving is and will remain a primary stock point function. However, the need for the SPLICE ABE application itself being transitioned to SPAR is highly dependent on which remaining Burroughs receiving programs the SPAR project office and application personnel decide to transition.

It is assumed that the pre-ABE receiving programs will not be considered for SPAR migration. If the Non-SPLICE ABE and associated Burroughs receiving programs are selected by SPAR for transition, no SPLICE ABE program migration will be required, but upgrade to the receiving process will be required to incorporate enhancements made within SPLICE ABE. On the other hand, if the SPLICE ABE and remaining associated Burroughs programs are selected by SPAR project and application personnel for transition to the new hardware, there will be a need to:

1. continue to provide a means to have replicated files on SPLICE or, if sufficient processing power is available on the new hosts, directly obtain MSIR and RDF file information from the transitioned files on the new hardware;

2. provide a means at SPAR transition time for SPLICE-to-SPAR process-to-process and terminal transaction

passing, and pass through via the HYPERchannel or some other high-speed data communications link.[30]

Therefore, the function must be migrated, while the form in which this migration takes is open to question.

Concerning the area of migration potential to SPAR in the receiving area, several comments can be made. The potential for migrating or transitioning the Non-SPLICE ABE programs would be appear to be no different than that present in transitioning any resident Burroughs on-line application. However, the user interfaces (e.g., terminals, printers, screen formats, inputs, etc.) will mostly likely be significantly different and the programs may require backfitting of SPLICE ABE processing improvements. This remains in the authors' opinion a feasible approach.

Migrating stock point receiving to SPAR with SPLICE ABE also appears feasible in that it reduces the SPAR transition application workload by exactly the number of programs and files that remain resident on SPLICE, maintains the current user interface, and facilitates NISTARS-to-SPAR interface.[31] This approach does appear to increase the environmental workload and risk in SPAR transition by forcing the issues of Replicated Files and TRANSRECON Offload replacement or

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[30]This second requirement exists exclusive of SPLICE ABE if SPAR wishes to continue to use SPLICE as their telecommunications and terminal concentration medium.

[31]This aspect will be discussed later.

interface earlier into the transition period. This approach also appears implementable.

The final area that will be addressed is how SPLICE ABE tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. SPLICE ABE directly supports and/or is supported by the following proposed SPLICE project objectives: 6, 7, 12, 18, 19, 28, 29, 32, 33, 34, 35, 41, 43, and 44.

There are several recommendations the authors have for possible enhancements to SPLICE ABE that will enable it to provide greater support or benefit to the corporation:

1. Investigate the implementation of a direct SPLICE ABE-to-NISTARS interface.

   a. This interface could be used to reduce direct Burroughs to NISTARS interdependence and thus help insulate NISTARS from SPAR transition.

   b. The interface could be used in several processing situations. First, when NISTARS receives incoming material first for stow and material has not been processed by UADPS Central Receiving, NISTARS could send SPLICE ABE a transaction that would put the receipt in-process within UADPS. SPLICE ABE would then interface with the other Application B programs as is done today. Similarly, NISTARS can also send clean, frustrated, and discrepant stow transactions to SPLICE ABE for recording and further transmission to other Application B programs/processes. If SPLICE ABE processes the receipt first, the expectant stow transaction and any similar transactions could also be sent to NISTARS from SPLICE ABE via this link.

   c. A second major use of this interface would be the ability for either SPLICE or NISTARS terminals to access the files of the other system for inquiry or possibly update purposes. In tnis manner any SPLICE resident terminal user could also be

afforded NISTARS and ABE file access to accomplish tasks such as researching inventory discrepancies from the SPLICE TLOD application.

2. Investigate the incorporation of both TANDEM based bar code reading and printing equipment into SPLICE ABE receiving.

   a. A bar code interface board to which commercially procured reader equipment may be attached is already an option on TANDEM 6530 terminals. These bar code reader interface boards could be immediately available using the SPLICE contract substitution clause. Reader equipment would require open procurement; however, the Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) project may be of assistance here.

   b. Medium and heavy duty laser printers, which are capable of printing bar code documents, are being procured and interfaced to SPLICE as a part of the APADE project. Similar or even more heavy duty printers can also be obtained and interfaced.

   c. Bar code readers on SPLICE ABE terminals could be used to input document number, stock number, or RCN information, as part of the SPLICE ABE initial[32] or follow-up inquiry function. Remote bar code printers from SPLICE could be used to print labels for material or bins, that could subsequently be used in inventory and issue processing. Also, document number, stock number, and location data could be bar coded on MMDs, which would require only re-wanding after storage to initiate the SPLICE ABE storage transactions.

3. Investigate the use of a more direct interface between SPLICE ABE, Application B, and the under development SPLICE Defense Data Access (DDA) System. Such an interface could be used to automatically input transactions to Application B processes which previously were received via AUTODIN/OLA, as well as forward on-line Application B external outputs to ICPs/Item Managers.

4. Investigate the downloading of program UA51, RDF scan, exception, notification output, and follow-up

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[32]Assumes that incoming receipts will contain bar code labels in the immediate future.

transaction generation to SPLICE using Replicated Files. This would provide additional capacity relief to the Burroughs, as well as permit more timely and frequent processing. Any RDF or MSIR master file update actions that now originate from this process would be sent to the Burroughs for master file updating.

5. Investigate the movement of the entire B07 Operation, Management Products, to SPLICE, using the SPLICE resident and replicated files. Implement, where possible with ENFORM.

6. Investigate the development of a SPLICE MTIS external user (i.e., for use by ships) screening and tracking process using REP FILES. This process should be executable by remote users, particularly from a shipboard DDN customer, with output/results returnable to the user. This process would indicate to the user which material to bring to the Supply Center, where to deliver it, indicate whether financial credit will be given for the return and any special processing instructions, indicate which material should be sent directly to disposal, and begin a tracking cycle for selected material, especially high value turn-ins.

This concludes the discussion of SPLICE ABE. The second SPLICE physical distribution application, the NAVADS project will be addressed next.[33]

C. NAVY AUTOMATED TRANSPORTATION DOCUMENTATION SYSTEM (NAVADS)

NAVADS, like ABE, is a central player in the physical distribution function at the NAVSUP stock points. Also like ABE, it was one of the original SPLICE designated applications that required immediate development and deployment when the SPLICE project was delayed in 1979.

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[33]It had been the authors' intention to discuss the SPLICE initiatives in the "G" Condition Depot Level Repairables area. Requested documentation on this application was not received.

The NAVADS system provides stock points with automated:

1. basic shipment related data for use in other modules;

2. management control of their shipping function and shipment consolidation recommendations;

3. shipment documentation preparation, including proof of shipment.[34]

The first two subsystems are Burroughs resident and are planned to remain so. It is the third subsystem, Subsystem III or the Automated Documentation Subsystem, that is designated for SPLICE transition from its current PE 3200 series hardware implementation, using the OSMT/32 operating system and utilities, the FMSO INS data communications software, and the TAPS software.

NAVADS Subsystem III, which will be referred to as simply NAVADS hereafter, is a very large application consisting of about 130 interactive and batch programs. For specific processing information, readers are directed to [Refs. 42 and 43]. A general overview of processing capabilities will be presented here to assist the reader in understanding this complex and heavily interfaced application.

Processing within NAVADS begins with the receipt by the PE system of requisition and shipment unit information from the Burroughs resident Subsystem II. This information may either be passed via a telecommunications line or in batches

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[34]References to transhipment and local delivery modules have been observed but no specific information on these impacting SPLICE was received from FMSO.

via tape from the Burroughs host. Received information is posted in up to three NAVADS PE TAPS files: the Requisition Data File, the Shipment Unit Data File, and the Hazardous Requisition Data file, if required. Once established in these files, the NAVADS system maintains positive control and provides a tracking capability against both material and shipments until all shipment and proof of shipment actions required have been completed.

Once shipment data is loaded, NAVADS users may apply: inquiries as to workload status; packing floor and shipping updates; input tracking or shipping modification information to the requisition and shipment unit Shipment Control Numbers loaded from Subsystem II and/or to the transportation unit Shipment Control Numbers assigned; and produce local hardcopy listings to assist in work scheduling or job staging. These inputs are primarily CRT originated, using Burroughs compatible devices, with outputs both CRT and remote printer destined.

While a shipment/transportation unit is passing through all required preparation and handling, shipping documentation is prepared on-line and printed at remote printers in the shipping area. Shipping documentation includes Government Bills of Lading, Commercial Bills of Lading, Military Shipment Labels (DD 1387-4), Transportation and Movement Documents (DD 1384), and Notices of

Availability (DD 1348-5). These various documents are affixed to shipping containers as required.

NAVADS completes its processing by preparing proof of shipment documents which can be forwarded back to the Burroughs hosts either on-line through telecommunications lines or via batch tape updates. It also prepares transaction images which are destined for AUTODIN I transmission (e.g., Notices of Availability, Transportation Control and Movement Documents, etc.).

NAVADS has a direct NISTARS TANDEM Non-Stop II interface role. This interface is physically accomplished via another telecommunications line and through tape passing. Interface transactions between NAVADS and NISTARS include cancellation processing; piece, weight, cube updates; issue adjustment transactions; split shipment unit transactions; shipment mode changes; Parcel Post/United Parcel Service (UPS) Proof of Shipment.

Finally, NAVADS provides management a whole series of reports to assist in keeping tabs on the response time critical shipping operation. These include: On-Line Local Delivery Report, Batch Shipment History/Report, Overaged Local Delivery Report, Overaged Parcel Post/UPS Requisition Report, Outstanding Transshipment Report, Requisition Late to Packing Report, and the Batch Tonnage Distribution Report, to name a few.

The transition strategy from PE NAVADS to SPLICE NAVADS is to keep the transition as transparent as possible to the application by porting TAPS, in its updated TAPS II PASCAL form, to the SPLICE TANDEM system. Now that TAPS II is available on SPLICE, current screens will be reimplemented in TAPS II, files moved to TANDEM ENSCRIBE format and interfaced to TAPS II, programs re-compiled into TANDEM COBOL and interfaced to TAPS II, and terminal device and security functions placed under the control of the FDC's SAS/TMAP processes. Without processing efficiency enhancements, TAPS II on TANDEM is not a usable product in an operational environment. These enhancements are being undertaken. The alternative method to get NAVADS to SPLICE would required a complete re-design by FMSO of the current system into the TANDEM native mode TPS using PATHWAY and ENCOMPASS, prior to any usage on SPLICE. Economic justification of this alternative would be difficult and would require continued PE TAPS support during the duration.

The benefits to the corporation from NAVADS are documented in [Ref. 42] and include: optimization of shipping personnel resources, positive control of and reporting on the status of the packing/shipping process at a site, workload planning and staging tools, automated preparation of labels and forms required for shipping, automatic proof of shipment passed to UADPS-SP, and an automated NISTARS interface. However, these benefits exist

regardless of any SPLICE initiatives. Transition of NAVADS to SPLICE additionally will provide the corporation four things: a reduction in non-SPLICE minicomputer system support; non-stop shipping support; a reserve, expansion, and growth capability for NAVADS; and the potential for developing an integrated physical distribution function.

The transition of NAVADS to SPLICE eliminates the need for approximately one half of the PE minicomputers in the NAVSUP inventory; the other half being used on FMSO IDA. This helps achieve one of the original SPLICE objectives: to standardize stock point minicomputers. This also reduces the need for vendor software support for NAVSUP PE systems as well as FMSO support for multiple versions of TAPS and current FMSO developed and maintained INS software. Software lease and maintenance as well as personnel savings can accrue to the corporation from this. As a longer term benefit, the number of different minicomputers which SPAR must interface to, and later absorb, will be reduced.

NAVADS on PE has periodically suffered from both hardware and software problems that have brought the system to its knees and subsequently backlogged the NAVADS shipping documentation efforts. In a single processor, non-mirrored disk, and single host resource environment, such as is present in the PE system, this will always be a potential problem. Since SPLICE has no single point of failure, employs mirrored disks to protect data, and has facilities

for sharing peripheral resources, system uptime and availability should be significantly improved when NAVADS moves to SPLICE.

The PE implementation of NAVADS had also experienced a capacity problem from its inception at its prototype site, NSC Oakland. This was evidenced by what was termed "the systems' inability to complete a day's worth of business within 24 hours." After numerous FMSO system tunings and program efficiency modifications, the immediate problems were resolved, but the long term specter of no growth, nor surge, and limited expansion capability has remained with the application. Additionally, the source for large enough PEs for follow-on sites has remained a question. SPLICE on TANDEM, with its available host capacity (i.e., 1,040 4MB memory processors) and modular expansion capability, requiring no application changes to accommodate growth, can provide the solution to this problem.

Lastly, in the interim to SPAR, SPLICE holds the key to integrating the non-Burroughs portions of the physical distribution system. With SPLICE ABE and NAVADS on TANDEM TXP hosts, NISTARS on TANDEM Non-Stop II hosts, and the ability of TANDEMs to logically function as a single system using off-the-shelf software, the potential for integrating or eliminating transactions, files, and non-TANDEM interfaces among these systems is very large. This will depend on FMSO's ability to assume the NISTARS system from

contractor support and being funded to perform the needed integration actions.

Assuming the transition of NAVADS to SPLICE, there is no need for migration of NAVADS to the SPAR transition environment. The SPLICE terminal and process-to-process interfaces to SPAR will, however, also be required here. When SPLICE is replaced by modernized SPAR, the SPLICE resident functions of NAVADS will require migration, but not the current processes. Elimination of SPLICE NAVADS will require both redesign and development on the new system.

Once NAVADS transitions to SPLICE, it will tactically support or can be made to better support the following proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies: 6, 7, 8, 12, 13, 14, 15, 18, 19, 29, 32, 35, 41, 47.

The authors have several recommendations for possible enhancements to NAVADS, when transitioned to SPLICE, that will enable it to provide greater support or benefit to the corporation. These are:

1. Investigate the integration potential for NAVADS and NISTARS files, transactions, and interfaces. Particularly, investigate the use of NISTARS transactions to update NAVADS files directly and vice versa and the substitution of new common files instead of separate files containing redundant data.

2. Investigate the interface of NAVADS to DDA in order to pass AUTODIN I destined transactions directly into the system.

3. When economically justified, replace the less functionally capable Burroughs terminals with either TANDEM or IBM 3270 series compatible terminals.

4. Investigate the distribution of NAVADS management reports to local management via TANDEM TRANSFER or PS/Mail, thus reducing hardcopy and paper output requirements.

5. Investigate the use of the TANDEM T-Text Word Processing capability to replace COBOL programs currently generating transportation documents, similar to that which is being done in APADE.

6. Develop a plan to transition the NAVADS application off TAPS II entirely to native mode TANDEM PATHWAY/ENCOMPASS. During PE to SPLICE transition of Subsystem III, convert batch programs to TANDEM native TPS mode, where economically feasible.[35]

7. If additional Burroughs capacity relief or downloads are desirable, investigate the download of both NAVADS Subsystems I and II to SPLICE. There appears nothing in either subsystem which mandates their processing on the Burroughs. If accomplished, this would return capacity to the Burroughs, reduce SPAR transition requirements, permit NAVADS to be implemented at any stock point where SPLICE is planned, and more closely integrate and collocate physical distribution functions on the TANDEM systems.

With these recommendations completed, the NISTARS application will next be addressed.

D. NAVAL INTEGRATED STORAGE, TRACKING, AND RETRIEVAL SYSTEM (NISTARS)

NISTARS is not, nor has it ever been, a SPLICE application. It is not SPLICE targeted and is still today a contractor maintained system. It is being included under

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[35]The authors are assuming that the original TAPS II conversion specifications, which called for the interface and use of ENSCRIBE files instead of TAPS/DM VISAM files, was executed. If so, standard PATHWAY or TANDEM COBOL programs should be able to process against these files concurrently with TAPS/AM applications. The specification was so worded to enable a phased transition from TAPS II to TANDEM native mode processing.

this section on centrally designed SPLICE applications because the authors feel that the future deployment of certain NISTARS concepts and programs on SPLICE can assist the corporation in accomplishing one of its primary missions: maintenance of accurate physical inventories and inventory records in the logistics system.

NISTARS is NAVSUP's flagship integrated physical distribution system.[36] When fully implemented, NISTARS will be able to automatically or with minimal user input control: inventory of parts and material; receipt processing including assignment of storage area; storage, tracking and retrieval of material for issue; consolidation of orders; and printing of shipment documents. The system is considered a "closed loop system." That is, it accepts known inputs from external sources, performs predefined functions based upon the content of the input, and reports the results of its action back to input source. The end results or benefits to NAVSUP of these activities are greater consistency in management and control of existing and/or expanded high demand parts inventories with fewer personnel, in a shorter time, and with greater accuracy.

Although these benefits were originally expected to accrue to only the NISTARS mechanized areas where high volume, fast moving items would be placed, with the

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[36]It is also probably the most audited due to its implementation slippage and cost increases.

publicizing of the NAVSUP inventory accuracy problems in the early 1980s a re-evaluation of this concept was undertaken [Ref. 44]. High volume items represent a low percentage of the inventory cost of the supply system; to get real control of inventory accuracy, NISTARS control needed to be extended to non-mechanized warehouses. The NISTARS project was able to accommodate this change of direction for planned sites by program changes and procuring an increased number of the NISTARS intelligent workstations.

NISTARS was originally designed and designated as an "embedded" vice general purpose ADP system: 85% of the system is considered process control and 15% interface oriented. This designation had been challenged by GAO in 1979, but the Navy did not concur with the finding. It maintained that NISTARS is a process control computer embedded in an automated material handling system (AMHS) and, as such, should not be procured under the Brooks Act (PL 89-306) as would any other general purpose ADP system. The NISTARS "embedded" system designation was useful at the time of initial system procurement since it eliminated several review and approval steps.

The total NISTARS "embedded" system consists of various automated material handling equipment components (e.g., tote boxes, manned storage retrieval machines, ministackers, binable manual storage retrieval machines, conveyors, sorters, consolidation carousels, etc.), TANDEM Non-Stop II

host processing systems, intelligent workstations for user interface, and software modules that perform: interface, issue, receipt, tracking, warehouse planning, storage location management, performance reporting, and management reporting. The NISTARS processing activities are driven by other data processes within mainline UADPS-SP, Non-SPLICE ABE, and PE NAVADS, by means of both on-line data communications and batch tape inputs.

A detailed discussion of planned NISTARS functions is available in [Ref. 45] and interface requirements specifications in [Ref. 46]. Due to the large number of functions and transactions performed by NISTARS and limited documentation held by the authors, no attempt will be made to provide sample NISTARS transactions or processing scenarios.

Currently, NISTARS is implemented at NSC Oakland and planned for NSCs San Diego, Norfolk, and Jacksonville. No definitive plans for NISTARS implementation or commercial automated material handling system alternatives for the other stock point hosts or satellite sites were uncovered during this research.

If no changes to current plans are made, NISTARS must be interfaced to the SPAR transition environment, both physically and programmatically. This will, at a minimum, require changes within the NISTARS interface module (e.g., no Burroughs telecommunications to support). At some point

during SPAR modernization, NISTARS functionality must be subsumed by SPAR, as the current NISTARS hardware approaches obsolescence. If the recommendations which follow are adopted, NISTARS will be shielded from SPAR transition by SPLICE, but will still require replacement by the post-SPLICE modernized SPAR system.

Before any recommendations in this area can be made, it should be noted that a "political" roadblock stands between NISTARS and SPLICE integration. SPLICE is designated as supporting general purpose ADP system applications, most of which require LCM approval independent of SPLICE itself. This difference in designation between NISTARS (embedded) and SPLICE (general purpose) can preclude the NISTARS-SPLICE interface recommendations already discussed within the SPLICE ABE and NAVADS application sections above, at least from the NISTARS side, and those recommendations to be presented below. Although this difference in system designation may be a problem, it is considered a political one, not an ADP one. The authors will advocate several additional technically feasible interfaces between the NISTARS and SPLICE projects that are in accordance with the corporation's information system plan. The political

"initiatives" to implement the recommendations are left for others to mastermind.[37]

The authors propose the following additional actions in the area of NISTARS-SPLICE integration be pursued, following government acceptance and support of NISTARS:

1. Move the Navy Systems/NISTARS Interface function to SPLICE.

   a. This relieves the Burroughs of the NISTARS data communications interface requirement; accomplishes a NAVSUP Strategic Information System Plan objective of removing telecommunications devices off the Burroughs FEPs; and physically insulates NISTARS from SPAR transition.

   b. All TANDEMs within a stock point can be interfaced to the Burroughs solely through the SPLICE HYPERchannel connection. NISTARS-to-SPLICE interface can be accomplished via TANDEM EXPAND/FOX or high speed TANDEM EXPAND/Direct Connect links. This would eliminate the support requirement for the Burroughs Tributary Monitor, a non-standard TANDEM-to-Burroughs telecommunications software package in NISTARS.

   c. The functional movement of the NISTARS interface function, validation, and edit routines to SPLICE returns some capacity to the NISTARS systems which can be used for other NISTARS initiatives.

2. Provide for all future NISTARS TANDEM capacity enhancements and future maintenance via the SPLICE contract.

   a. The SPLICE available TANDEM technology is more current and the price/performance ratios and

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[37]It may be useful to note that NAVSUP has a blanket approval from NAVDAC/NAVMAT to "download" functionally equivalent or "change of media" UADPS-SP processes to SPLICE. Once NISTARS becomes an accepted UADPS-SP application, it could be argued that the non-mechanized warehouse portions of NISTARS, exclusive of the AMHS processes and hardware, may be functionally transitioned to SPLICE replacing existing manual/card processes, via mere notification in follow-on SPLICE SDP document submissions.

volume discounts are much higher than that obtainable from Sperry.

b. Monetary savings can accrue to the government by having a single maintenance contract (e.g., spares support, start-up costs, etc.) for all TANDEM hardware at a single NAVSUP stock point. The NISTARS hardware, once government owned, can be covered by the SPLICE maintenance contract, instead of a separate contract to Sperry.

c. In a related vein, consideration should be given to replacing all the NISTARS processors with SPLICE Non-Stop TXPs and re-deploying the Non-Stop IIs to future SPLICE MAPS sites. Most MAPS sites do not appear to require the full TXP minimum configuration to perform their mission. NISTARS priority, foot print requirements, backup requirements, and need for commonalty with SPLICE hardware at a host site would justify this step.

3. Upgrade all NISTARS environmental software to current SPLICE levels and maintain, in support of the following:

   a. Current NISTARS non-standard recovery methods should be upgraded to off-the-shelf Transaction Monitoring Facility procedures, with additional capacity required provided by SPLICE.

   b. Current NISTARS application routines written in TANDEM Transaction Application Language (TAL) (equivalent to assembler language) should be identified, isolated, and transitioned to TANDEM COBOL or FORTRAN, with SPLICE providing any needed additional capacity. This will make these routines more maintainable by the government and portable. If this is not possible, task maintenance of these routines to FDC as part of on-site FMSO support.

   c. The NISTARS applications written in the pre-PATHWAY TPS should be upgraded to PATHWAY. This means less development software to have to train for, maintain, and distribute, as well as having a single TPS which is supported by TANDEM corporate.

   d. NISTARS applications should be interfaced to the SPLICE Security Access System. This provides a secure mechanism for other SPLICE application systems to interface to NISTARS and provides a

single security system for all stock point TANDEM applications.

e. When all NISTARS software is at SPLICE release levels, future FMSO release, maintenance, and testing of TANDEM off-the-shelf software will be greatly facilitated.

4. Investigate the augmentation or replacement (when required) of the $30,000 Sperry Intelligent Remote Terminals (IRTs) with IBM compatible Personal Computers (PCs) or TANDEM DYNAMITE workstations, configured with bar code readers, printers, magnetic badge readers, etc., to perform required functions.

5. Isolate NISTARS non-mechanized warehouse processing applications in each NISTARS functional area, repackage, and export as a Mini-NISTARS application to all non-NISTARS stock points using SPLICE. This will assist the "system" in inventory accuracy. If in fact non-mechanized NISTARS warehouse control at current NISTARS sites does assist in inventory accuracy, exportation to all SPLICE host sites should also be justified and "self-financing" in terms of monetary saving from improved inventory accuracy. Use results of recommendation 4 above for non-mechanized IRTs.

6. Refer to recommendations in SPLICE ABE and NAVADS areas for further functional area integration efforts.

The result of this NISTARS-SPLICE marriage will be tactical support for the following proposed SPLICE project objectives: 6, 7, 8, 9, 11, 12, 19, 28, 29, 32, 33, 38, 41, and 48.

This concludes the discussion on NISTARS-SPLICE "merger." The SPLICE REP FILES and TRANSRECON Offload initiatives will be addressed next.

E. REPLICATED FILES (REP FILES) AND TRANSACTION RECONSTRUCTION (TRANSRECON) OFFLOAD

REP FILES and TRANSRECON Offload are not, strictly speaking, "applications." They are environmental mechanisms

from which application rich off-shoot areas have emerged: the SPLICE Information Center and Application "P" Inquiry System. In that these processes are so interrelated, they will be addressed within a single area.

The history of REP FILES and TRANSRECON Offload is not long in terms of years; they have only existed since 1983. The first to evolve conceptually was REP FILES, with TRANSRECON Offload developed as the means to implement it.

During the 1982-1983 timeframe, NAVSUP, NAVDAC, FMSO, selected stock point representatives, and the Federal Simulation Center were addressing the interim stock point capacity issue, with a direct tasking to come up with firm recommendations to ensure that sufficient usable capacity would be available to get the stock points through the 1980s or until SPAR could provide the final solution. The problem was multifaceted. SPAR was too far away. SPLICE promised capacity but few applications to use it. Burroughs was wavering on producing more B4800s and hinting at a new B4900. Faced with such a tasking, the various factions present brought in their hired consultants to provide corroboration to their versions of "what should be done."

Besides those contractors which studied the issue and simply recommended replacing the whole UADPS-SP system immediately or advocated sole source procurement of large Burroughs hosts as solutions, one proposal suggested a usage of the IBM Information Center concept. Specifically, it was

proposed that either tape extracts or periodic electronic images of Burroughs data files be loaded in another format (e.g., a DBMS or data manager) on an IBM or plug compatible host, and, then, subsequent redesign of selected applications be undertaken to use this data there instead of processing on the Burroughs. Among the applications suggested for use in what was termed an "information center" were terminal and batch inquiry processing, the UADPS-SP effort to provide users ad hoc reporting (UH30 SUPERSCAN), and End-of-Day processing.

The idea had merit but was discarded for several reasons. Without SPLICE or some similar effort, the existing Burroughs compatible terminal base could not be used on other systems. Using multiple terminal types was inadvisable due to procurement costs and space limitations at the stock points. Regardless of the terminal issues, stock point representatives indicated that unless the replicated data was "simultaneously" updated along with the Burroughs master, it was not current enough for their users and would not be used. These problems eliminated the on-line inquiry applications from further consideration. The tape data extract concept to move post-TRANSRECON End-of-Day processing was also discarded because so much of End-of-Day processing required the use of Burroughs data files and the passing of transactions back to other Burroughs applications. The stock point representatives also balked

at the massive tape processing that would be required to implement this approach. Without these other application areas, the effort required just to do batch inquiries and UH30 SUPERSCANs on another host could not be justified.

The interim capacity task group finally recommended that a combination of SPLICE and B4800s could handle the stock point capacity problem until SPAR. In the interim, SPLICE was directed to come up with applications that could be "easily downloaded" with high payback to the Burroughs [Ref. 47]. This was accomplished, but required that SPLICE implement the information center concept discussed above to do it, despite the problems [Ref. 48].

The key to implementing the SPLICE Information Center was to find a mechanism that could forward images of Burroughs data file updates to SPLICE in real-time, while minimizing added workload to the Burroughs. In the event that workload would be added to the Burroughs, it had to be compensated for through equivalent environmental or application workload removal. The problem was easily broken into pieces for analysis; its implementation was not so easily accomplished.

The real time passing of data from the Burroughs to SPLICE could physically take place over the HYPERchannel, in a manner similar to that planned for terminal traffic. Therefore, this aspect added no new workload to the

Burroughs.[38] The initial load of REP FILES on SPLICE could be done from normal Burroughs data file backup/recovery tapes, therefore, this too added no new workload. The Navy Burroughs environmental mechanism through which recovery images of data file changes were captured on disk or tape was called SCSP, and at the time was the only place where "hooks" could be incorporated to capture data file updates images for SPLICE "simultaneously"[39] with their update on Burroughs. However, SCSP was already believed by FMSO environmental personnel to be a "system" bottleneck in terms of throughput, therefore, adding an additional function to SCSP was unthinkable.[40] Another approach was required in this area. This aside, the SPLICE resident REP FILE and TRANSRECON file structures and update programs would also have to be developed, but as a wholly SPLICE resident process, these would have no impact on the Burroughs. Finally, the applications to be "downloaded" would have to be developed on the TANDEM, again with no negative processing impact on Burroughs.

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[38]The changes required in SDCH to accommodate the SPLICE HYPERchannel transactions and the interface Burroughs process itself to the HYPERchannel are additional Burroughs workloads, in their own right.

[39]SCSP was recommended for modification to perform this function by the FMSO SPLICE Project office. It was felt that changes here would be most transparent to application personnel. Any other approach would (and did) require application modifications.

[40]SCSP also has other functions not specifically germane to this discussion and which it still performs.

The final solution to the data record update capture problem required all Burroughs application programs which made disk I/Os to be recompiled and retested using several new copy routines. The incorporation of these new copy routines, tied to a new Burroughs environmental program called SREC, permitted the relocation of the update journaling function or TRANSRECON process to be selectable as to location. At a non-SPLICE site, SREC would maintain Burroughs resident TRANSRECON files on disk or tape for master file reconstruction purposes and End-of-Day processing. At a SPLICE site, SREC would permit the passing of the TRANSRECON images to the Burroughs HYPERchannel interface module, which was expected to interface with a Network System Corporation Burroughs Network Executive (NETEX) software product and a FDC interface product. These images would be sent to SPLICE.

When the Burroughs NETEX package failed to be usable in an operational environment, FMSO developed and implemented their own HYPERchannel interface between the TANDEM and Burroughs (i.e., TABU) systems. The following describes the basic REP FILE/TRANSRECON processes using TABU:

1. SREC passes a SPLICE directed TRANSRECON record through the Burroughs side of TABU and the HYPERchannel to the SPLICE portion of TABU and the SPLICE Complex Manager;

2. data is posted as received to a replicated data TANDEM entry sequence file;

3. this raw replicated entry sequence file data is read and segregated into at least one, and possibly up to nine Burroughs Activity Code files per Burroughs host;

4. the appropriate SPLICE replicated file is updated with the record image, if it is a data file update;

5. at close of business, activity code segregated TRANSRECON files are closed; TRANSRECON files are dumped to tape and forwarded to the Burroughs for further processing.

A more detailed explanation of these processes in available in [Ref. 49].

These SPLICE replicated files are essentially exact duplicates of their Burroughs masters or at least contain exactly the same data as that which would be used to reconstruct the masters if they were lost. The files being replicated to date are the MSIR, RDF, Requisition Status File (RSF), and the Demand History File (DHF).

Once the replicated files were available for use, FMSO application personnel were able to download and implement 18 different informational screens previously only available on the Burroughs for SPLICE terminal inquiry use [Refs. 50 and 51]. Additionally, it was now possible for significant numbers of batch UH30 SUPERSCANS and UB54 Batch Inquiry runs to be directed from the Burroughs to the SPLICE replicated files using ENFORM based inquiries. Further, these replicated files are available as source data inputs to other SPLICE processes.[41] Concerning End-of-Day processing using the SPLICE TRANSRECON, beyond the activity code split,

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[41]Examples are the SPLICE ABE or TLOD applications.

no information was received concerning further download to SPLICE, although a project still exists to do this.

The major benefit that REP FILES and TRANSRECON Offload provide to the corporation is the potential for freeing up Burroughs capacity. This capacity can be used by stock points for other business, as a reserve for new or enhanced future FMSO Burroughs applications, or as a survival tool usable while awaiting SPAR. Several less major benefits also accrue: decreased response times for terminal inquiries using replicated files; less turn-around time for reports directed against replicated files; a user and/or programmer oriented ad hoc report capability, not present on the Burroughs; and the ability to implement other SPLICE processes requiring master file source data using the replicated files.

The question of the need and potential for migration of these processes to SPAR is a delicate one. First consider need. It is hoped that SPAR receives sufficient funding to obtain all required stock point site hardware and software, as well as funding and time to perform the transition of all FMSO and critical local applications and interface these to non-SPAR resident required interfaces (e.g., NISTARS). If so, SPLICE could immediately give up many of its current functions or applications and concentrate solely on SPAR telecommunications issues. In light of the current Gramm-Rudman balanced budget initiative and the inability of other

similarly large ADP projects to adequately size and budget for all new equipment requirements on day one, particularly user information center and fourth generation language driven requirements, it is questionable that sufficient funding will be forthcoming.

The ability to use SPLICE, a sunk cost, to absorb some of the stock point inquiry and report oriented workload, particularly during transition, should not be discarded too rapidly, even though it means continued, temporary, duplicate data. Therefore, it is assumed that the need to retain SPLICE REP FILES and TRANSRECON Offload will exist as SPAR transition funding becomes a target for savings.

The potential for migration of these functions, which should be limited to the SPAR transition period, depends on the corporation's willingness to develop and implement environmental software that performs functions similar to those performed in the new Burroughs copy routines, SREC, and TABU. If so, the SPLICE information center can be re-established and the SPLICE TRANSRECON function possibly serve as a forward/backward bridge for SPAR transition.

The potential for migration is also dependent, however, upon how the SPAR transition system data base is planned and what will be done during transition to applications expecting inputs currently obtained from the TRANSRECON. It may not be possible to replicate the transitioned data bases if a DBMS is used during transition. No references could be

located on how non-recovery functions of the current TRANSRECON process would be handled during SPAR transition. Until the SPAR procurement proposals are available for inspection and a transition plan is documented in detail, further comments in this area are merely speculation.

The final area that will be addressed is how REP FILES, TRANSRECON Offload, and the SPLICE Information Center tactically support or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. These initiatives directly support and/or is supported by the following SPLICE project objectives: 6, 7, 8, 10, 11, 12, 19, 23, 28, 29, 32, 33, 34, 35, 45, and 46.

There are several recommendations the authors have for possible enhancements in the REP FILES, TRANSRECON Offload, and the SPLICE Information Center areas that will enable it to provide greater support or benefit to the corporation:

1. Expedite the replication of (or in many cases, initial disk load of) the Management List - Navy (ML-N) on SPLICE and provide update and inquiry programs to support it. This activity had previously been planned for SPLICE to eliminate programs C-UB46, C-UB47, and C-UC91, as well as a number of local uniques. When SPLICE provides shipboard access to these files for inquiry, the use of this on-line, accurate ML-N would be of great assistance in ensuring the accuracy of requisition stock numbers and in pricing replenishment and not-carried shipboard requisitioning actions.

2. Request NAVDAC to investigate the automation and development of a Master Cross Reference List (MCRL) file and application on SPLICE, including both updating and inquiry programs. The resulting system could be implemented at NSCs, NARDACs and NARDAFs. Direct shipboard benefit could accrue from this

initiative in the area of locally matching Federal Supply Code for Manufacturer/Part Number items to National Stock Numbers. This would reduce both procurement leadtime and purchase activity workload. The file could also be of some use to stock point Technical Personnel for "first cut" research efforts on non-standard requisitions.

3. Investigate the incorporation of the full TRANSRECON processing portion of End-of-Day operation directly into the SPLICE Environmental TRANSRECON Splitting Process. This specifically includes the functions performed by programs H-UJ96 and H-UJ97. The functions performed by these processes appear more environmental than application oriented and could be done "on-line" during the current splitting process.

4. Replace the current TRANSRECON bulk file tape passing between Burroughs and SPLICE with a HYPERchannel on-line bulk file transfer capability, including direct interface to applicable MAPS scheduling routines. Tape processing among systems is error prone and requires much operator intervention never planned for within SPLICE.

5. As a longer term measure, re-investigate the downloading of the remainder of End-of-Day processing and other Application H report generation to SPLICE.

    a. Considering the reduction of tape handling this would result in, the potential reduction in operator costs, the direct interface to DDA that would be available without operator intervention, the ability to feed other SPLICE on-line processes directly (i.e., TLOD), and the ability of SPLICE to absorb such transaction splitting and duplicating workload to return capacity to the Burroughs, the apparent delay in implementing (or no plans to implement) these downloads should be re-evaluated.

    b. With End-of-Day on SPLICE, electronic distribution of the Application H repetitive reports (e.g., 1144, Semi-annual Stock Status Report, etc.) will be possible through TRANSFER client servers locally and SPLICENet/DDN for long-haul distribution. No such capability exists on the Burroughs.

    c. Current SPAR Modernization Strategy [Ref. 52] calls for the elimination of End-of-Day processing in its current form. Taking steps now to

eliminate the current process from the Burroughs by moving it to SPLICE simply reduces the required SPAR transition effort required later, when resources will be more strapped for time.

6. When SPLICENet is fully functional, investigate the creation of a user library of SPLICE User Information Center ENFORM inquiries, at either FMSO or FDC. Such a library would lesson the need for users to "re-invent the wheel" on local inquiries, functions, and reports processed against replicated files. When implemented, library products could be copied or file transferred for use at local sites.

7. Implement a stock point 9 Cog Asset Visibility program using the SPLICE REP FILES (i.e., MSIR). Both individual site inquiry processes for determining asset status and a network oriented process which · would summarize all stock point asset status could be implemented.

This concludes this section on REP FILES and TRANSRECON processing. The Statistical Location Survey application will next be addressed.

F. STATISTICAL LOCATION SURVEY (STATLOC)

STATLOC, previously called the Inventory Location Audit Project (ILAP), is a SPLICE stock point management/quality control related application and one of the most recent to have successfully completed prototype. STATLOC is a method to validate the physical location of items. It is accomplished through the reading of bar coded location and stock number labels of items in stated inventory locations, verifying material present, and comparing the results of these efforts with that which is recorded on UADPS-SP master records. When discrepancies are uncovered, action is taken to correct records or restore material in correct locations.

The benefits that STATLOC is expected to bring to the stock points include: improved warehousemen productivity, improved location/inventory record accuracy; the elimination of the previous card oriented location survey process; and the generation of previously unavailable management reports. A further possible benefit, if the program continues on its successful track, may be the elimination of certain annual wall-to-wall inventory requirements.

The current SPLICE STATLOC system is based upon a similar ILAP system developed on a PDP-11/70 minicomputer and prototyped by NSC Norfolk. STATLOC was transitioned and enhanced by a contractor to run on SPLICE in the 1984-1985 timeframe and was prototyped at NSC Jacksonville in 1985. Subsequent to the prototype, enhancements were undertaken to eliminate tape handling and reduce and consolidate the number of transactions required. The enhanced system is now being implemented at all NAVSUP stock points.

The STATLOC process begins with the selection and generation of a range of survey locations to be validated. This was previously done solely as a batch process on the Burroughs and a tape of location/item records produced and loaded to the TANDEMs. An alternate process is now available which provides needed survey data from terminal input using the replicated SPLICE MSIR file and, thus, reduces Burroughs workload.

Once the locations/items to be audited are selected and available on SPLICE, a SPLICE terminal is used to build load files to facilitate further download of portions of the entire audit range to TELXON 701 portable bar code reading microcomputers/scanners carried by the warehousemen. This download is accomplished via TANDEM host software and the RS-232 asynchronous port on the TANDEM terminal. Accountability for which transactions have been downloaded and to which devices is maintained throughout the process.

After the TELXON 701s are loaded, warehousemen audit specified locations, barcoding locations and verifying that designated items are present. Discrepancies are noted and corrected. When the audit process is complete, the data stored in the TELXON 701s is uploaded to the TANDEM, again via a terminal, where it can be reviewed or edited. Discrepant data is reformatted into transactions for further Burroughs processing and currently passed to the Burroughs via tape. New bar coded location and item labels may be generated, as well as mandatory (e.g., new item and location changes, no material found, material found and MSIR zero, etc.) and optional (e.g., missing/damaged location label, missing/ damaged item label, etc.) reports produced. Further information on STATLOC processing is available in [Refs 53 and 54].

The residency of STATLOC on SPLICE should preclude the need to migrate it to the SPAR transition environment.

However, based upon the decision to continue or eliminate REP FILES during transition, the range of location survey selection process may have to be taken off SPLICE and returned to reside solely on the new SPAR hosts. Remaining interfaces should not require migration to the SPAR transition environment, as they can be accommodated via the SPLICE-SPAR HYPERchannel interface or can be easily moved back to a tape interface. STATLOC will require replacement in the SPAR modernized UADPS-SP system.

STATLOC tactically supports and/or is supported by the following proposed SPLICE objectives: 6, 11, 12, 28, 29, 32, 33, 35, 38, 41, and 49.

The following recommendations should be evaluated by the LOGMARS/SPLICE projects to assist in the further attainment of corporate/project goals and objectives:

1. Investigate the download of additional portions (or all) of the UADPS-SP inventory process (Application I) to SPLICE to eliminate card processing, increase warehousemen productivity, increase inventory accuracy, and capitalize on available LOGMARS processing technology implementable now on SPLICE.

2. When available, replace the Burroughs-to-SPLICE output tape interface with a HYPERchannel bulk file transfer interface.

3. Investigate the interface and incorporation of radio frequency terminals with bar code readers directly to SPLICE processors to eliminate the need to upload and download data to remote devices.

4. Plan for the movement of the current TAL process which transfers data to the TELXONs to an intelligent terminal, such as a PC interfaced to SPLICE or a TANDEM DYNAMITE workstation. Movement of this code to a PC based interface makes the remaining STATLOC processes, written in TANDEM COBOL, more portable as

well as making the PC-TELXON process usable on any host that a PC can be interfaced to. Task maintenance of the revised TELXON-intelligent terminal interface to FDC.

5. Investigate the eventual replacement of the TELXON devices with competitively procured lap-top micros with bar code readers. Such devices, with a floppy disk interface, would be more easily interfaced to intelligent PC workstations, thus eliminating the need to develop and maintain Navy unique environmental software as required in the current interface.

This concludes the discussion of STATLOC. The next SPLICE application to be addressed is TLOD.

G. TRANSACTION LEDGER ON DISK (TLOD)

TLOD is an application that can easily be placed either under the inventory management or the stock point management (quality control) functional area. This is because the application not only provides a capability for inventory managers to review historical events for their material assets, it also provides quality assurance personnel increased control over identifying the causes of and correcting effects of material gains and losses which result from errors in material management.

The TLOD concept is simple: have available for interactive use, a one or two years history of a stock point's business activities or transactions (e.g., receipts, issues, adjustment actions, closing balances, etc.). This on-line transaction history can then be used to investigate processing discrepancies, particularly those which result in

inventory accuracy problems, financial adjustments, or for other causative/explanatory research purposes.

This concept was implemented at least three times. The first time was a FMSO developed and released Burroughs program and file resident version, which went to all UADPS-SP sites. This version was subsequently enhanced by NSC Norfolk personnel, implemented there, and given to other UADPS-SP customers who might desire to use it. This second version again provided for Burroughs file residency and program processing.

There were several problems with both of these prior Burroughs TLOD versions:

1. Burroughs Host dependence - This resulted in two problems:

   a. when the Burroughs was down, causative research stopped. Although this could be tolerated for short periods of time, the worker productivity loss resulting from this was unacceptable.

   b. long response times. TLOD was not considered a "strategic" application to stock point operations, in that it had few mandatory users. This resulted in insufficient processing priorities being assigned to it to get acceptable response times and, thus, to provide for worker productivity.

2. lack of Burroughs hardware availability. TLOD requires additional Burroughs hardware (i.e., a great deal of disk and terminals) that was not immediately available on NAVSUP contracts or that would only be necessary until SPLICE. This latter situation made justification for this hardware very difficult.

3. Due to the inflexibility of the Navy Burroughs BRAM/HAM accessing methods, inquiry processing requiring numerous non-collocated records was not efficient. Also, no alternate key support was available.

The third version, called SPLICE TLOD, was developed by FMSO incorporating the Norfolk improvements as well as enhancing the system overall to correct the above problems. It was prototyped along with SPLICE itself and REP FILES at NSC Jacksonville in the fall of 1984. It is currently being implemented at all NAVSUP stock points.

The processing scenario of SPLICE TLOD is very straight forward [Refs. 55 and 56]. SPLICE TLOD begins with file transition from either the old FMSO or Norfolk Burroughs TLOD systems to establish a SPLICE TLOD file baseline. After this, daily updates are applied to these SPLICE resident on-line history files via tapes, which are extracted from the TRANSRECON via the End-of-Day processing string on the Burroughs. Once this is completed, users may, at will, execute a series of nine pre-defined terminal inquiries or other ad hoc inquiries against the SPLICE TLOD files to obtain needed information to perform causative research. Outputs can be either terminal or printer directed.

A second pre-programmed usage of SPLICE TLOD is to accept inquiry requests from the Burroughs for a specific transaction history of an item within a given parameter range. These requests, received from a Burroughs queue, may be passed to SPLICE on-line over the HYPERchannel or via tape and, when processed, result in a printed output of the requested history. The printed listing, the Manual Research

Inventory Listing, is then forwarded to the customer and used for pre/post-inventory research.

SPLICE TLOD files are purged on a monthly basis, or as desired, removing the oldest month(s) or as directed by the users. In many cases, disk availability and cost will be the controlling factor, as it was in the decision not to mirror SPLICE TLOD data files.

The benefits SPLICE TLOD provides the corporation are numerous. The inventory accuracy, monetary, and customer support benefits provided by all TLOD versions (i.e., being able to locate misplaced material through causative research) are obvious. In specific reference to SPLICE, however, SPLICE TLOD provides one of the means to assist all the stock points in resolving the inventory accuracy problem, since the abundance of SPLICE hardware permits this program to be implemented on a system wide basis. Finally, SPLICE TLOD not only enables users to research specific problems, but also permits them the time and tools with which to research and identify systemic problems.

There are less obvious quantity and quality aspects to these benefits also. SPLICE TLOD permits users real time access to transaction history records, thus permitting them to process more causative research actions in a shorter period of time. SPLICE TLOD eliminates the need for voluminous paper listings of transaction history to be maintained. Besides its ascetic value, this paperless

aspect of SPLICE TLOD reduces storage requirements and decreases lost user productivity in paging through mountains of listing to find a single item or item history.

Moving now to the area of SPLICE TLOD migration need, several comments are germane. First, TLOD, regardless of the version being discussed, is inherently tied to current Burroughs TRANSRECON processing. If during SPAR transition, TRANSRECON maintenance and processing is perpetuated on the new SPAR system or is performed on SPLICE, SPLICE TLOD will be able to obtain its currently required input and, therefore, will not require migration to the SPAR transition environment. If some other scenario is planned, a redesign of SPLICE TLOD, perhaps moving it back to the new host environment, will be required. In the SPAR modernized environment, SPLICE TLOD should be unnecessary, as its function will be performed by new processing capabilities planned for this functional area.

SPLICE TLOD currently supports and/or is supported by the following proposed SPLICE objectives: 6, 7, 11, 12, 18, 19, 23, 29, 32, 33, 34, 35, 41, 46, and 50.

Concerning recommendations for further beneficial enhancements, the following should be evaluated by the SPLICE TLOD project to assist in the further attainment of corporate/project goals and objectives:

1. When economically justified, replace existing Burroughs TLOD terminals with TANDEM 6530s, PCs, or IBM compatible devices to provide greater terminal functionality.

2. When a Burroughs-to-SPLICE HYPERchannel bulk file transfer capability is in place, eliminate tape passing from the Burroughs to SPLICE.

3. Investigate the use of the SPLICE TRANSRECON to directly feed the SPLICE TLOD function. This may be done in conjunction with the download of End-of-Day processing to SPLICE, particularly the download of program UA32 processing.

4. SPLICE TLOD is one of the few SPLICE resident processes that does not use mirrored files. If file re-loads due to downtime become a problem, fund additional disk in order to mirror disk and make the SPLICE TLOD function Non-Stop.

5. Investigate the need and possibility of including other SPLICE application history transactions in the SPLICE TLOD data base (e.g., NISTARS, NAVADS, etc.) to obtain complete transaction history.

This concludes the discussion on SPLICE TLOD. The final application to be discussed, UCEPS, will next be addressed.

H. UADPS-SP CONTROLLED EXCEPTION PROCESSING SYSTEM (UCEPS)

UCEPS[42] is a SPLICE based effort designed to regain control of (primarily) Burroughs exception processing at the stock points, while simultaneously modernizing this processing aspect overall. To understand the purpose served and benefits provided by UCEPS, one must first understand what exceptions are and how they are currently handled within Burroughs UADPS-SP.

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[42]UCEPS, although sorely needed at the stock points, is a splinter project salvaged from a larger plan to enhance demand processing overall on SPLICE in a standard manner. The larger plan was called Application C Enhanced (ACE). ACE appears to have been deferred due to higher priority stock point initiatives (i.e., SPAR).

UADPS-SP is a combination batch oriented and on-line, time/volume transaction initiated system. When executing in either mode, there are frequently occasions when transactions cannot pass programmatic validations and, therefore, are rejected for human intervention. In the case of many on-line transactions, validation exceptions are immediately returned to the user for correction. If not an on-line transaction or, in some cases, if an on-line transaction that the user does not want to correct immediately, these "errors" or exceptions to normal processing must be returned to the user in some other manner for correction and re-input.

UADPS-SP application processes have four options to choose from in these cases: 1. SPOOL the exception as a card punch file to disk; 2. record the exception on the RSF and SPOOL it as a card file to disk; 3. place the exception on the TRANSRECON for punching after End-of-Day processing; and 4. record the exception on the RSF and place it on the TRANSRECON for punching after End-of-Day processing. Regardless of the method used, the exception cards must be punched and returned to the user from Data Processing for correction and re-input.

There are several problems with all of these approaches. If the exception is returned to the user on-line (e.g., a card image placed on line 24 of the input CRT or punched at the input card reader/punch), the user may have to re-input

the source data as well as correct the error. This is non-productive and in many cases requires the maintenance of card reader/punch equipment. The user can also lose or "misplace" the exception entirely, potentially suspending processing or eliminating processing on the transaction that caused the exception.

The batch mode of exception processing is equally problematic. Cards have to be punched, requiring the maintenance of obsolete mainframe card equipment. Performing card operations is a labor intensive process in terms of operational manpower and computer resources to perform TRANSRECON/End-of-Day processing. Card processing is wasteful of time in returning them to the customer, in making many times minor corrections from source documents no longer held at the workstation, and then receiving them back from the customer for re-input. During this correction process, cards also have a tendency to get damaged, lost, or misplaced, which again may suspend or terminate transaction processing.[43]

UCEPS is designed to address all of these problems. The benefits which will accrue are as follows: elimination of obsolete card equipment; controlled access to and processing of exceptions with virtual elimination of lost records; and decreased time to receive, correct, and turn-around

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[43]In the case of the exceptions that are recorded on the RSF, there are procedures to reproduce the exceptions.

exceptions. From these steps, UCEPS should result in earlier problem identification and greater user productivity.

The design of UCEPS is explained in detail in [Refs. 57 and 58].[44] A brief explanation of proposed processing follows to assist the reader in understanding this application.

The key to developing UCEPS will be in the method used to forward Burroughs exceptions, that previously went just to the TRANSRECON, to a new SPLICE resident file called the Exception Control File (ECF). What appears to be proposed is a change to an unspecified Burroughs copy routine "to send the exception and additional information across the HYPERchannel to be logged to a disk holding device" [Ref. 59]. Once on this SPLICE holding file, another UCEPS process will then validate the exception, primarily as a duplicate check, and if no duplicate exists, place the record in a SPLICE ECF for on-line correction by applicable application personnel and for statistical reporting.

Associated processing improvements also to be provided include:

1. on-line inquiry and correction of entries on the ECF. Exceptions may be worked as groups or on an individual basis, by applications area. Corrected exceptions will be forwarded back to the Burroughs on-line and

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[44]Both of these references are draft documents, therefore, final processing may be modified as a result of the testing/development process.

deleted from the ECF and placed in an appropriate history file (i.e., Exception History File (EHF)).

2. a narrative explanation of exceptions being worked to supplement the two character, often cryptic, codes currently generated. This system narrative file will also be supplemented by a local narrative file for site specific comments and instructions.

3. a re-cycle capability to automatically forward exceptions back to the source, when the exception generated was due to a time related file condition and the only exception processing required is re-input at a later date.

4. UCEPS file maintenance (e.g., history purges, narrative file updates, etc.).

5. exception report generation (e.g., audit trail, statistical, workload, turn-around time, etc.).

These improvements will initially be available to Application C (Demand Processing) programs, then to nine other Burroughs applications. SPLICE resident applications will also be provided "hooks" into the UCEPS files so that a single exception system will be available for all UADPS-SP user applications, regardless of program or processing location.

The need and potential for migrating the functions of UCEPS to the SPAR transition environment will not exist if SPAR will allow "environmental" software to be written and called by applications to enable them to pass exception transaction images over the HYPERchannel to SPLICE, so that ECF updating can continue there. If no environmental software is written to do this, UCEPS will have to be re-designed and re-implemented on the new SPAR hardware prior to transition system implementation. Under SPAR

modernization, UCEPS should be subsumed by new SPAR on-line transaction processing methods and, thus, eliminated from SPLICE.

SPLICE UCEPS is supported by and/or supports the following proposed SPLICE project objectives: 12, 19, 23, 24, 29, 32, 33, 34, 35, 41, and 45.

There are several recommendations that the authors have concerning UCEPS to enable it to provide even greater support to the corporation:

1. Modify the same copy routines used to accomplish SPLICE TRANSRECON Offload to accommodate UCEPS.

    a. At a site where the TRANSRECON is being maintained on SPLICE, modify the file replicator software on TANDEM to place exceptions from the SPLICE TRANSRECON onto the holding file that is the input to the UCEPS ECF. This eliminates duplicate exception images having to be sent down the HYPERchannel to SPLICE (i.e., once for SPLICE TRANSRECON Offload and once for ECF input).

    b. At a site where the TRANSRECON is being maintained solely on the Burroughs, optionally do not record exceptions on the TRANSRECON. When the option is taken not to record the exception on the Burroughs TRANSRECON, send the transaction down the HYPERchannel to the SPLICE UCEPS process. If exceptions are still to be recorded on the Burroughs TRANSRECON, do not implement UCEPS without a thorough Burroughs capacity study.[45]

2. For on-line Burroughs applications which return errors immediately to the user, evaluate the need to place an

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[45]When the TRANSRECON remains on the Burroughs and exceptions are written to it, that requires Burroughs overhead. If this is done AND another image of the same exception must be written to the HYPERchannel, that adds additional Burroughs workload which is not being compensated for via workload off-load. Prior to doing this, a capacity study for the site must be undertaken to ensure that the benefits from implementing UCEPS will outweigh the costs.

information-only record of the exception on the UCEPS ECF or EHF.

a. In some Burroughs applications (i.e., Application N UN50), the on-line validation programs appear to return exceptions to the input terminal based upon the terminal mode the user is in (i.e., in frames mode, to line 24; in Roll Down Input Top (RDIT) mode, to the top of the screen). Exceptions may still be lost here due to user error or if exceptions roll off the screen.

b. The proposed ECF or EHF information-only image of the exception may be the only place to recover the lost exception and perhaps the entire transaction.

3. UCEPS is being implemented in a phased approach, starting with Application C. Rather than continuing with Burroughs applications, consideration should be given to next developing the UCEPS interface to other SPLICE resident applications, particularly those currently in design or development (i.e., APADE or SPLICE ABE). In this way, UCEPS interfaces could be implemented while the application is under development, vice requiring a major maintenance action later.[46]

4. Investigate the incorporation of other system exceptions into UCEPS. Specifically, NISTARS and NAVSCIPS exceptions should be considered.

5. Do not let the successful implementation of UCEPS become the only portion of ACE to be implemented on SPLICE. There are simply too many benefits available to the corporation from implementing ACE, particularly if SPAR transition funding is curtailed, to permit its demise. At a minimum, a method must be provided to issue material and generate DD-1348-1s, including bar code data, on the SPLICE system using the replicated MSIR as the source when the Burroughs is down. All such issues must be locally recorded on SPLICE, without changing the quantity on the replicated MSIR, and transactions collected to forward back to the Burroughs to update the master MSIR.

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[46]This recommendation is being provided because in no other application documentation reviewed for this thesis was there any mention of an UCEPS interface. Hopefully, this is merely an oversight.

These recommendations conclude both the discussion of UCEPS and this chapter on centrally developed SPLICE applications. The next area to be addressed will be locally developed SPLICE applications and their support of corporate and project plans.

V. LOCALLY DEVELOPED SPLICE APPLICATIONS

A. CHAPTER OVERVIEW

The contagion concept described by Nolan and Gibson [Ref. 60], also referred to as the technology learning and adaptation concept by Cash, McFarlan, and McKenney [Ref. 61], is at work today at the stock points who have received their SPLICE hardware. Essentially, both these concepts describe a phase of ADP technology infusion where users have received systems to perform some initial tasks and have themselves discovered other productivity enhancing tasks that the same systems can also perform. When users have demonstrated that these additional endeavors promise high payback for minimal investment and are permitted to pursue them, substantial unexpected paybacks can accrue to the organization. Once this situation is identified, it is management's job to exploit these paybacks through organization wide dissemination of the new uses for the technology.

This chapter deals with three locally developed SPLICE applications that fit this mold. All three were implemented with minimal initial investment and can have applicability across all stock points. The authors intent in describing these initiatives is to make the corporation aware of these

"home grown" initiatives on SPLICE, in the hope that they will be applied stock point wide to attain corporate goals.

The first application to be discussed deals with a TANDEM based Electronic Transfer of Funds (EFT) application to Federal Reserve Banks (FRBs) for civilian payrolls. The second local unique application is a method for entering payroll data via SPLICE terminals instead of punched card or non-standard key-to-tape/key-to-disk systems, as is currently done by the many of the stock points.[47] The last application is an approach to interim stock point office automation that has been successfully prototyped at NSC Pearl Harbor.

B. ELECTRONIC FUNDS TRANSFER (EFT)

EFT is a very expeditious way to get payroll data to the regional FRBs for further distribution to employees' direct deposit accounts at designated financial institutions. The Treasury of the United States informed all government agencies in 1983 that EFT is the preferred method of making payment of recurring benefit and salary payments through its Direct Deposit/Electronic Funds Transfer (DD/EFT) program. [Ref. 62]

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[47] It had been the authors' intention to also address the joint NSCs Norfolk/Pearl Harbor Source Data Automation (SDA) project using SPLICE, which has only recently been documented. Unfortunately, required documentation on this initiative was not received.

Under DD/EFT, a disbursing office through its ADP processing activity sends its civilian mechanized payment data to the local servicing FRB, two to three days before each payday. The data may be delivered on magnetic tape via mail or courier, or transmitted via telecommunications from the submitting activity. The FRB will strip away the payments going to the institutions it serves and then send the remainder of the pay data to the FRB's automated Clearing House for further dissemination to non-serviced institutions.

Most stock points are taking advantage of DD/EFT today by submitting their payroll information through magnetic tape sent via mail or couriers to the FRBs, since the Burroughs cannot support the appropriate protocols to send this data via telecommunications. There are several problems with this approach, however. First, the batch oriented non-Navy standard payroll process used today at stock points often results in late payroll runs or re-runs. With the requirement to have DD/EFT data to the FRBs several days before a required payday, any problems experienced processing the payroll leaves little time left to physically move tapes to FRBs. Secondly, many of the stock points are in areas that periodically experience incapacitating weather. In such cases, delivery of tapes might also be delayed. Finally, both the mail and courier services are

subject to holiday workloads, inadvertent package losses, and theft.

To overcome these shortcomings, NSC Norfolk has developed a DD/EFT data communications transmission procedure using SPLICE. The procedure is simple. Payroll data on tapes from Burroughs Application K are taken to the SPLICE TANDEM where it is loaded to disk, after resolving the data format inconsistencies between the two systems. Then a process is run which inserts data communications control characters in the data, as required by the FRB. To commence data transfer, the NSC calls the FRB to request permission to transfer. The FRB then establishes connection to the TANDEM system via a 4800 bit per second line. When connection is established, the NSC executes a TAL application which interfaces to the TANDEM ENVOY data communications software and sends the payroll data. After the transmission is accomplished the FRB will call the NSC for a verification of the number of records sent and totals of the payroll transmitted.

The SPLICE TANDEM system configuration required to implement this application is equally simple. A data communications line must be available from the FRB to the TANDEM and configured on the TANDEM system as a point-to-point line using a bisynchronous protocol provided in ENVOY and connected to a byte-synchronous controller. All of

these components are available from the SPLICE contract. The NSC TAL application is, obviously, Navy unique.

The benefits to the corporation from this simple application at NSC Norfolk are threefold. First, there is an elimination of some manual operation in the secure delivery of payroll data, which should result in some monetary savings (i.e., couriers). Secondly, since its takes less time to physically transmit the payroll data, less lead time is required by Data Processing to receive the payroll outputs. This time differential is available to be used, when necessary, to accommodate batch payroll process re-runs or late runs. And thirdly, the system has been implemented without the need to use scarce FMSO CDA development resources and is now available to other stock points at little cost.

Concerning migration to the SPAR environment, the authors believe that a need exists to have a similar facility available at the stock points during both phases of SPAR. During the transition phase of SPAR, SPLICE can perform this function for customers having SPLICE hardware and in behalf of customers who do not. One would assume that SPAR modernization should not need to be concerned with this requirement in that the Navy Standard Civilian Payroll System, NAVSCIPS, is assuming the payroll processing requirement from UADPS-SP. However, as will later be seen in Chapter VI, a SPLICE or its successor system will still

be required to perform the transfer function, unless NAVSCIPS assumes this role directly.

The last area that will be addressed under this application is how the EFT process tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. The EFT process directly supports the following proposed SPLICE project objectives: 8, 9, 12, 15, 19, 27, 29, 32, 35, and 36.

To better achieve these objectives, the following recommendations should be considered:

1. The NSC Norfolk EFT system should be enhanced to use the HYPERchannel to pass the outgoing bulk file payroll data from the Burroughs to the SPLICE system and further improved to eliminate the required calls made back and forth between the stock point and FRB. A mutually agreed upon security system with verification and automatic call back could accomplish this second suggestion.

2. The enhanced NSC Norfolk EFT system should be designated the stock point standard system, and implemented at all stock points within local data communications range of FRBs. NSC Norfolk will remain lead CDA for the system.

3. Gateways to FRBs at the SPLICE sites within the vicinity of FRBs should be established so that other stock points can also pass their payroll data to FRBs via SPLICENet.

4. If NAVSCIPS fails to provide similar EFT transmission capabilities, the SPLICE EFT system should be used to accomplish this function, as a back-end process to NAVSCIPS.

If these recommendations are implemented, this simple local application can easily be made to be the standard UADPS-SP DD/EFT interface to the FRBs and enable the benefits that

NSC Norfolk receives from it to be shared by all stock points.

This concludes the discussion of EFT processing. The next local application to be addressed is the NSC Norfolk Payroll Processing System.

C. PAYROLL PROCESSING SYSTEM

As will be discussed in the next chapter, payroll processing within the Navy today is performed by numerous "standard" and local systems. One of the requirements common to each of these systems is the need to get the time and attendance (T/A) data into the processing systems. At many stock points today, this is accomplished by using a myriad of non-standardized keypunch, key-to-tape, or key-to-disk systems. At the NAVSUP stock points, the output from these processes are uniformly fed as inputs to Application K on the Burroughs systems.

Several problems result when standard inputs, in this case payroll T/A inputs, must be generated from non-standard systems. First, a proliferation of hardware types results making support, maintenance, and replacement very difficult, as well as uneconomical. Secondly, multiple software applications to assist users in inputting data in required formats must be obtained, maintained, and interfaced to other systems. In the environment we face today, this directly results in duplicate and unnecessary software

development and maintenance manpower costs, particularly if input requirements change, as they will under NAVSCIPS.

The Payroll Processing System (PPS) developed by NSC Norfolk on SPLICE addresses both of these problems and provides as a very efficient way of getting standard input into the current UADPS-SP payroll system via terminal entry. This system is applicable to UADPS-SP payroll processing today, and as is addressed in the next chapter, will be equally applicable after the implementation of NAVSCIPS in late 1986 or early 1987.

The NSC Norfolk PPS process is started by a program on the Burroughs, that when called, creates and downloads payroll skeleton payroll records to an unlabeled tape. The unlabeled tape is then taken to and loaded on the SPLICE system by a program called PAYLOAD. PAYLOAD purges the data in the current PPS payroll data files and loads the skeleton records in their place. These skeleton records are then ready for terminal update by the payroll department using TANDEM PATHWAY screens painted specifically for this update process and the time/labor cards manually completed by employees. [Ref. 63]

After the payroll department has completed entering all the current pay period data, a second program, called PAYCARD, takes the input data and generates a card image file which can be dumped to tape and fed into the Burroughs Application K payroll process. From this point on the

Burroughs processes the payroll data as if it had been input directly to it via cards.

There are several benefits that this simple application has provided NSC Norfolk. In using this PPS application the NSC has eliminated the need for punched cards or non-standard key-to-tape type equipment for payroll; only the standard SPLICE equipment need be used. This system has eliminated the need to send this data to an area other than payroll for media change (i.e., from sheets of paper to punch cards) and input. Keeping the data within the payroll section adds more security (i.e., less chance for unauthorized changes or data loss) to the system and permits the payroll clerks themselves to input the payroll information instead of wasting time having to manually prepare forms for someone else to use. This process has also permitted errors to be corrected on-line as they occur, instead of having to review and return inputs to another section for later correction. Finally, this new process permits more time for payroll clerks to audit payroll data instead of merely having time to locate keyed errors that result from the card generation process and the illegibility of the writing.

PPS, like EFT discussed above, should not pose a problem to SPAR during its transition phase, if the system is uniformly implemented on SPLICE at all stock points. In the event it is not, SPAR will face the replacement or interface

of card and key-to-tape or disk systems to the new hardware and transitioned programs. In that NAVSCIPS does not directly provide for the input of T/A data, SPLICE or its successor system, appears to be required to provide this function under SPAR modernization.

The final area that will be addressed is how PPS tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting corporate and project goals and strategies. PPS directly supports and/or is supported by the following SPLICE project objectives: 9, 12, 27, 29, 32, 33, 35, and 36.

Although PPS is a local system, it has the potential for use stock point wide and providing support for corporate goals and the SPLICE objectives listed above. To this end, the following recommendations are made concerning PPS:

1. That PPS be designated as the standard payroll pre-processing system for the UADPS-SP community and implemented system wide on already available SPLICE equipment. NSC Norfolk will remain CDA. This move, when followed by similar cardless environment and SDA projects (i.e., UCEPS and the emerging NSCs Norfolk/Pearl Harbor SDA projects), should eliminate the need for non-standard source input equipment, support applications, and interfaces to other systems.

2. That PPS output formats be modified to the NAVSCIPS input format when that system is delivered to the field and serve as the stock point standard T/A data input mechanism under that system.

3. That in the interim to NAVSCIPS, improvements be made to PPS to enable file passing between SPLICE and the Burroughs via HYPERchannel, eliminating the need for manual tape operations.

This concludes the discussion on PPS. The NSC Pearl Harbor Office Automation initiative will be addressed next.

D. OFFICE AUTOMATION INITIATIVES

Office Automation (OA) can be defined as the automating and linking of nine functions: stand alone computing, word processing, graphics, electronic spreadsheets, personal data base management, personal management (i.e., calendars, telephone directories, etc.), a computer with communications capabilities for access to and source data automation of mainframe applications to improve efficiency, and a window to data sources both internal and external to the organization [Ref. 64]. To a great extent within the stock point community, OA appears to have been left as a local prerogative in the interim to SPAR.[48] The result of this has been a concentration solely on local (i.e., command) word processing, using whatever money, hardware, and software that the site could obtain (i.e., Productivity Enhancing Capital Investment (PECI) funds).

Although not within the project charter, with SPLICE, it is possible to develop and implement a standard stock point OA function, covering all of the above processing areas under the current SPLICE contract. With some additional

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[48]This is a conclusion on the part of the authors. It is based upon two facts: 1. there is no OA standard hardware or application software in UADPS-SP, and 2. the inventory of the stock point OA stand alone equipment includes WANG, XEROX, NBI, and IBM (all procured locally).

efforts, this standard interim stock point OA system could be made to interface with the other existing major OA initiative within NAVSUP: the ICP system. The lead organization for this effort has been NSC Pearl Harbor (NSCPH).

The NSCPH Data Processing Department analyzed tne nine OA functional areas and determined that all of these functions could be provided by SPLICE on a phased basis using an integrated micro based system to distribute functions, instead of performing all these functions on a mainframe. In Phase I, standardization of microcomputer hardware and software would be undertaken, to perform local word processing, data base, local graphics, spread sneet calculations, and other desired personal computing. The second phase would provide for local site shared disk storage, shared text files, shared peripherals, interface to the TANDEM hosts for multiple host access and source data automation, and the addition of E-MAIL. The third phase would provide the ability to share the documents and mail created locally with other users using the same products on remote systems linked by telecommunications and to achieve full interoperability through DDN. [Ref. 65]

NSCPH initiated Phase I with the procurement of 45 TANDEM DYNAMITE microcomputers, each with 256KB of RAM and dual 360KB disk drives. These microcomputers are IBM PC compatible and were selected over other IBM compatible PCs

to provide for dual usage of these devices (i.e., as PCs and as TANDEM 6530 terminals) in other phases. Most workstations included printers for single workstation use. Software selected included: dBase III, Lotus 1-2-3, and Multimate Advantage. The former two packages were selected as they are established industry leaders; the latter for its ease of use and support for the IBM Document Content Architecture.

The second Phase, which was implemented six months later, consisted of the connection of the DYNAMITE workstations to the TANDEM hosts as 6530 terminals using standard TANDEM point-to-point protocols. This step enabled: the introduction of local source data automation initiatives from these terminals; E-MAIL using TANDEM's TRANSFER/MAIL product between departments;[49] and the interfacing of other PCs, sharing of TANDEM host printers, and the exchanging of files among existing DYNAMITE PCs

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[49]TRANSFER/MAIL will be upgraded to the new TANDEM PS Mail product in the near future. PS Mail is a software product that will let you draft memos and send them along with other documents to users. PS Mail is a full service electronic mail system that guarantees delivery of mail and interfaces with Tandem 653x, IBM 327x, and asynchronous (TTY) terminals, personnel computers, and Group 3 facsimile machines. This software is menu driven and gives both full screen display and on-line help. [Ref. 66]

using TANDEM's PC LINK software.[50] In this phase, NSCPH also planned to eliminate its Xerox 860 word processing system.

The final phase, which will be implemented in the near future, will consist of connecting the NSCPH SPLICE system to the DDN via SPLICENet[51] to enable users to access other SPLICE system applications, pass data or files, and use E-MAIL to converse with other activities on SPLICE. At some point, when full DDN interoperability is provided by SPLICE, these capabilities are expected to be usable in interfacing with NAVSUP and DDN subscribers using standard DDN service protocols. A WANG system used in the NSCPH Joint Personnel Property Support Office would be eliminated in this phase. [Ref. 68]

In the opinion of the authors, the NSCPH plan for implementing OA at its site can serve as the basis for an interim standard OA function at the all stock points. There are several areas in this plan that require further definition and others where improvements can be made.

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[50] PC Link allows users to do the file interchange functions with the TANDEM hosts or each other while using DYNAMITE workstations or IBM PC compatible computers. It also allows the IBM PC compatibles to emulate both Tandem 6530 and IBM 3270 terminals. Any document created on a PC can be loaded up to the host and then shared by multiple users. The commands to do these functions are MS-DOS commands so user's need not learn new commands and can use the TANDEM's mirrored disks as their hard disk. [Ref. 67]

[51] See Chapter VII for further details on SPLICENet.

However, the basic plan appears sound for an interim OA system. These areas will be elaborated upon in the recommendations section for this application.

The benefits that are accruing to NSCPH and can accrue to the corporation if this basic plan were adopted at all SPLICE sites are as follows: increased white collar productivity, decreased paper generation for own-site and inter-system mail and reports, standardization of interim OA initiatives requiring a single replacement strategy by SPAR, and reduced telecommunications, terminal, and peripheral costs through the introduction of multifunction workstations that can share resources and SPLICENet.

If such as system were adopted stock point wide, the need to address OA functions during SPAR transition would be eliminated. SPLICE would be available to fulfill this role until the SPAR modernization effort were sufficiently along that stock point OA could be addressed as a separate issue. When appropriate for SPAR during modernization, it could then address the replacement of stock point OA functions concurrent with addressing SPLICE replacement.

The final area that will be addressed is how Office Automation tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. Office Automation directly supports and/or is

supported by the following SPLICE project objectives: 1, 12, 13, 14, 15, 16, 19, 23, 25, 29, 32, 33, 34, 35, 41, and 45.

There are six recommendations that the authors have that could improve this application to increase corporation benefit, assuming that it is accepted as the interim stock point OA system. These are:

1. It may be more cost effective to implement local area networks (LANs) of PCs instead of using point-to-point data communications and DYNAMITE workstations. Consideration should, therefore, be given to using the recently announced TANDEM PC LAN interface product in lieu of the current NSCPH connection method for future implementations not using DYNAMITE workstations.

2. Standards need to be established concerning word processing document storage and interchange formats, particularly in light of plans to move documents intra-site and inter-site. The standard Multimate format may be acceptable for all PCs using Multimate on a departmental system, but this format is too restrictive outside of this environment. Storage of documents in Document Content Architecture format, a Multimate option, is recommended for documents to be stored for later revision or shared use on TANDEM disks, as well as for usage by the TANDEM word processor T-TEXT/PS TEXT and for those documents being moved throughout the SPLICE system or to other systems. Document Interchange Architecture format should be used for inter-system interchanges.

3. Gateways will need to be established for documents being sent to non-SPLICE systems, particularly to the ICPNet E-MAIL system or at the NARDACs to the SperryLink system. FDC (or TANDEM through FDC) should be tasked to develop the TRANSFER client servers or other processes needed to transform SPLICE produced documents stored in DCA/DIA formats to both of these systems and incorporate the inter-net transmission requirements into their SPLICENet proposal.

4. The NSCPH proposal does not address standardization of PC graphics packages (beyond LOTUS 1-2-3) or personal support packages such as calendars. Standards should be established for all software products to be used.

5. If the NSCPH proposal is accepted for corporate stock point use, bulk site licensing or corporate quantity purchases should be pursued to generate savings over buying PC software packages individually. Network system discounts should also be pursued in that both local PC networks with system servers can be implemented to store software and the TANDEM host system itself can store software for connected PCs through the TANDEM host FILE SERVER software package.

6. NAVSUP itself is not a planned SPLICE site/user, although it will probably be the intended recipient of much of the stock point E-MAIL traffic. Consideration should be given to implementing a small SPLICE office system, based on the TANDEM EXT system at NAVSUP headquarters, and tied into SPLICENet through the FDC facility at Chevy Chase. At a minimum, NAVSUP should have a facsimile machine available at headquarters so that hardcopy output can be received by NAVSUP.

This concludes the discussion of the OA application.

Before the area of SPLICE related financial applications is addressed, one additional comment concerning locally developed applications must be made. It is extremely important that NAVSUP functional and SPLICE personnel monitor the local applications being developed, such as those described above, for possible implementation stock point wide. From the authors' review of preliminary documentation on such systems, it is also imperative that standards for local system documentation, development, maintenance, lead CDA responsibility, and most importantly data naming standards be established and mandated for use in these locally developed systems.

VI. FINANCIAL/PROCUREMENT APPLICATION SUPPORT THROUGH SPLICE

A. CHAPTER OVERVIEW

This chapter will address selected under development, planned, and existing applications in the financial services and procurement/contracting functional areas, as well as make proposals on how they might benefit from improved use of and interfaces with SPLICE. The same format for applications analysis specified at the beginning of Chapter IV will also be used in this chapter.

The first application to be reviewed, the Automation of Procurement and Accounting Data Entry (APADE) system, is from the procurement/contracting functional area of UADPS-SP. APADE is currently under development by FMSO for use on SPLICE hardware. The method to be used in analysis here will be to review the existing development plans for the application and make recommendations for improved use of SPLICE capabilities where appropriate.

The second section deals with a project that promises an all new financial and accounting system for the Navy. It is designated the Integrated Disbursing and Accounting Financial Information Processing System (IDAFIPS). The perspective to be used in this presentation is that of the developers and how they see the system being implemented. The authors will then make recommendations on how this

system can be better supported by using SPLICE in its system integration and telecommunications support capabilities.

The third section concerns a system that has already been implemented at the Navy stock points as a forerunner to IDAFIPS. The system is known as the Integrated Disbursing and Accounting DX Phase II(B) E. It should be noted that this system, part of the original FMSO Financial Management Improvement Program (FMIP) at the stock points, will be replaced in the future by the standardized version of IDAFIPS which is under development by the Navy Comptroller Standard Systems Activity (NAVCOMPTSSA).

The final section is also financial in nature, but is more limited in scope then the previous three. The fourth section addresses the Navy Standard Civilian Payroll System (NAVSCIPS) that is also being developed by NAVCOMPTSSA. In this area, following a discussion of major functions, the authors have made recommendations on how NAVSCIPS might be better implemented within the stock point community by using SPLICE in some of its interface and data entry roles.

With this plan of action mind, the discussion of the APADE application can be undertaken.

B. AUTOMATION OF PROCUREMENT AND ACCOUNTING DATA ENTRY SYSTEM (APADE)

The Navy Supply System cannot afford to stock all the repair parts, material, and services that are required for its efficient operation or to meet all customer demands. It

is often necessary to procure items and services on the open market. NAVSUP has been designated responsible for administering the purchase/contract functional area and uses a Navy Field Contracting System (NFCS) to perform this function.

Numerous attempts have been made, both centrally from FMSO and at local activities, to automate this labor, paper, and time consuming function using a variety of vendor hardware, software, and applications. [Ref. 69] summaries many of these efforts. To date, none of these efforts have met with complete success and, thus, none have resulted in system wide deployment of an application. Failure to make progress in this area has resulted in much of the continued criticism of the entire Navy procurement "system" both externally and internally.

From the second "rising" of SPLICE in 1979, plans have been in place to address the NFCS support area via hardware and software procured by the SPLICE project and application software developed by FMSO. Only since 1984, however, has high level Navy interest to do this become evident and commonplace, apparently resulting from the Buy Our Spare Smart (BOSS) initiative [Ref. 70]. The new APADE system is the result of this heightened interest.

Specifically, APADE will provide NFCS activities a standardized ADP hardware and software system which can provide:

1. document control;
2. management and buyer support information;
3. automated document preparation;
4. and stand-alone, collocated host, and satellite ADP processing support.

The underlying concepts being used by APADE to implement these capabilites are: 1. an automated "birth-to-death" document control system; 2. integration of data and word processing; 3. single source data automation with location independent process-to-process interaction; and 4. maximum use of interactive processing.

System monitoring within APADE will begin with on-line requisition input, which will be possible both electronically from remote systems and locally from terminals on the APADE system itself. Monitoring, tracking, and automated status reporting to external and local system users then is possible and continues through the entire technical review and contracting processes. Assisted by automated support tools, APADE users can: plan procurements; prepare solicitations, purchase orders, contracts, amendments, and modifications on system produced standard government forms; and interact with financial, supply, and administrative processes to provide updates and status. An extensive range of management and buyer reports are planned for automation including work-in-progress reports, completed work or productivity reports, all reports required by law or

regulation, POA&Ms for individual procurement vehicles, as well as an ad hoc reporting capability.

The FMSO APADE functional design document includes seven processing areas to perform the above functions which include, requisition input/update processing, pre-award processing, award processing, contract management processing, inquiry processing, report processing, and system management processing. See [Ref. 71] for detailed specifications. A phased implementation approach, including a prototype system, will be utilized.

The benefits which can accrue to NAVSUP from successful implementation of the APADE application within NFCS include:

1. reduced procurement administration lead time and actual overall procurement time;
2. increased information accuracy and management control;
3. increased NFCS worker productivity;
4. and improved interfaces with other systems.

Several aspects of plans for implementing APADE on SPLICE are worthy of note in terms of increased corporate support and supporting higher level NAVSUP planning initiatives. First, APADE intends to maximize system integration efforts by providing on-line interfaces to systems such as UADPS-SP, the Shipyard Management Information System/Material Management (SYMIS/MM), the NAVAIR Industrial Management System (NIMMS), the IDA systems, and the Engineering Data Management Information and Control System (EDMICS) [Ref 72]. Electronic requisition

inputs from applicable systems are necessary to reduce the amount of re-keying of data within APADE itself. Electronic interface to EDMICS appears required to provide buyers the use of centralized technical data. Automatic electronic status, reporting, and financial transactions from APADE to other applicable systems also appears required to reduce buyer time lost in providing manual status or generating non-procurement related transactions to these foreign systems.

Secondly, APADE plans to make use of state of the art technology for system user input/output devices. PCs are planned for use as multifunction workstations. These PCs can be interfaced to the SPLICE TANDEM hosts as TANDEM 6530 terminals either through TANDEM provided PC LINK software or via FDC provided third party TANDEM terminal emulation software. In terms of output, laser printers will be used for generation of contract related forms and high speed line and remote printers for management reports. No plans for support of card input or output are evidenced.

Finally, APADE appears to have successfully incorporated an integrated data processing and word processing approach within the application. Although the interface details are not specified in the documentation reviewed, the same APADE terminal will be capable of using TANDEM data processing facilities under PATHWAY/ENCOMPASS (e.g., for inquiries, buy

status updates, etc.) and the TANDEM PS TEXT/T-TEXT/PS TEXT FORMAT word processing facilities for document preparation.

Having described its purpose and potential benefits to the corporation, the APADE application can be now analyzed in terms of its need and potential for migration to the SPAR Project. In that APADE will be totally SPLICE resident, there appears to be no need to migrate it to the SPAR transition environment. A transaction and process-to-process interface between SPLICE and SPAR will be required immediately so that electronic inputs to APADE and status from APADE can be forwarded to/from transitioned UADPS-SP on SPAR on-line. However, this should be no different than that required in SPLICE ABE or for SPLICE terminal connectivity.

In that SPAR will eventually replace all SPLICE applications, the APADE application must be supported under modernized SPAR. The potential for moving this function to SPAR appears good in light of increasing emphasis of major hardware manufacturers to provide both data processing and full word processing capability on the same hosts. However, in that the TANDEM data and word processing environments are so different from that of any of the potential SPAR contract bidders, a complete re-design of APADE on the SPAR hardware should be anticipated at the end of its life on TANDEM.

The final area that will be addressed is how APADE tactically supports or can be made to better support the

proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. APADE directly supports and/or is supported by the following SPLICE project objectives: 4, 5, 6, 7, 12, 13, 14, 15, 29, 30, 31, 32, 33, 34, 35, 41.

There are several recommendations the authors have for possible enhancements to APADE on SPLICE that will enable it to provide greater support or benefit to the corporation:

1. Develop an APADE Hardware Interface Requirements Specification).

   a. The APADE FD indicates several on-line interfaces to SPLICE that SPLICE does not currently support or for which SPLICE has been unable to obtain approval. These include Data General hardware for EDMICS support, Honeywell DPS-6 for SYMIS/MM support, and Univac 1100 interface for Navy Laboratories or NIMMS support.

   b. Include within this the nature of the connectivity required. If a high speed, large volume data interface to a collocated processor is required (i.e., U1100), that may be easily accommodated, assuming that the host concerned has a HYPERchannel interface. If terminal or data communications interface is required, that represents a different problem and must be addressed separately. If multiple system terminal access is required, that is yet another problem.

   c. Include which of these systems does/will support X.25 and DDN. Support for either may make long haul interface requirements simpler to satisfy.

2. Develop an APADE Software Interface Requirements Specification.

   a. Assuming the issues within hardware connectivity are resolved, the application level interfaces among these systems must be addressed and specified. Although it may be a simple matter to forward an APADE generated status transaction to a UADPS-SP program over HYPERchannel, there may be no existing application on a DPS 6 running

SYMIS/MM expecting an external system generated data communications status input, for example.

b. Include complete input and output formats for transactions to avoid later confusion, if other than standard MILSTRIP formats are required, as the documentation reviewed indicates.

3. Investigate the need for a direct APADE to EDMICS interface and perform a cost and feasibility study prior to implementation.

   a. Does a need really exist for buyers to see EDMICS drawings and specifications on-line at their terminals, or will it suffice to have technical personnel print applicable documents on their independent EDMICS terminal printers and attach them to the hardcopy procurement request?

   b. TANDEM does not today support CAD/CAM/CAE or graphics applications except on stand alone PCs. Unless bit-mapped graphics streams can be passed through the TANDEM via an existing protocol or emulation package (i.e., SNAX, TR3271, EM3270, etc.), through an application, to a connected APADE PC workstation with graphics capability, this interface may not be possible.

   c. Unless the EDMICS system is a planned DDN user, SPLICE may have great difficulty getting data communications access to it.

4. Investigate the use of TANDEM's PC LAN interface capability for terminal interconnection at all sites, but particularly stand alone sites such as Navy Regional Contracting Centers (NRCCs). In that APADE plans to use PCs, it may be more advantageous to obtain and use the TANDEM host/local area network interface for PCs in terms of cost, speed, obtaining/installing data communication lines, and original equipment manufacturer support, than to use PC LINK/EM6530PC or third party TANDEM terminal emulation software and the TANDEM 6100 communications subsystem.

5. Require the implementation of DDA at stand alone APADE sites for transaction and status passing, along with the planned DDN interface. DDA is currently not scheduled for NRCCs.

6. Investigate the development of TANDEM TRANSFER or PS/MAIL client servers to distribute reports destined

for NAVSUP or other SPLICE sites. Such servers can be easily interfaced to PATHWAY applications, providing immediate electronic, paperless report distribution locally or over SPLICENet.

7. Ensure the APADE data naming conventions remain consistent with both NAVSUP 508 [Ref. 73] and the emerging SPAR standards, to ease later transition.

This concludes the discussion of APADE. IDAFIPS will be the application to be addressed.

C. INTEGRATED DISBURSING AND ACCOUNTING FINANCIAL INFORMATION PROCESSING SYSTEM

The Integrated Disbursing and Accounting Financial Information Processing System (IDAFIPS) is designed to streamline and automate the Navy's financial management system. The purpose of IDAFIPS is to provide the Navy with:

> A timely and accurate performance of disbursing functions and the updating of accounting data bases; to interface with other financial and supply systems; to generate fiduciary reports and provide for on-line inquiry and update; to validate mechanically input data elements; and to support electronic data entry at field activities and the financial information processing centers (FIPCs). [Ref. 74]

The system is comprised of five subsystems, which are described below.

The Integrated Disbursing and Accounting Financial Management System (IDAFMS) is the primary subsystem within IDAFIPS. The main purpose of IDAFMS is to mechanically integrate the accounting and disbursing modules at field level activities and provide a standard financial management system. This system will also fully automate the bill paying functions for the Navy at the field level.

More specifically, IDAFMS operates as follows. Invoices received from vendors will be passed through a mechanized payment certification process and be validated against procurement documents input previously by the fund administrators.[52] The system will also automatically take discounts and certify the invoices to be passed to the disbursement module for check generation and then onto a report generation module for the necessary record updates. In addition to handling bill payment processing via check generation, the disbursing module also will take care of all the allotment accounting and disbursing for field level claimants ashore using O&M,N, O&M,NR, and RDT&E dollars.

IDAFMS will be implemented at 13 regional sites, called FIPCs, using a real time access data base system. All FIPCs should be collocated with SPLICE computer sites. The data base at each FIPC will be accessible through remote terminals for on-line updates, as well as for batch updates and report transfers. The IDAFMS data base will provide sufficient information to meet all the required financial management needs of the Fleet Accounting Activities (FAA's) serviced by the FIPC's and all that is required by the FIPC itself. Over 900 FAAs will be supported by the FIPCs.

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[52]If properly designed and interfaced, APADE could provide these inputs directly.

In summary form, IDAFMS will use modern telecommunications capabilities to provide Navy management with data for:

1. planning, programing, and budgeting resources;
2. executing against budgeted resources;
3. effective control over all assigned funds for which the Navy is responsible;
4. and timely, complete, reliable, and accurate financial reports for internal Navy management use and for external agencies and authorities (e.g., OMB, Congress, Treasury, DOD).

IDAFMS system features include:

1. random access data base processes located at the regional FIPCs;
2. extensive internal control requirements;
3. use of telecommunications to support interactive terminals and computer-to-computer exchange of data;
4. and interfaces with other IDAFIPS subsystems. [Ref. 75]

The telecommunications interfaces for IDAFMS, and most of IDAFIPS for that matter, will be locally provided by the selected hardware manufacturer and eventually by DDN for long haul communications. In the interim to having a DDN capability or interface, land lines will be used for long haul communications.

The second subsystem of IDAFIPS is called IDAFMS OPFORCES, and will be the standard Navy operating forces accounting system. IDAFMS OPFORCES will work closely with and through the IDAFMS module. IDAFMS will take care of effecting the IDAFMS OPFORCES accounts payable transactions

through its mechanized bill payment certification process and, at the same time, report to the Financial Reporting System (FRS) module.

IDAFMS OPFORCES is to provide the following specific features:

1. an integrated accounting and reporting system for deploying and shore based Operating Target (OPTAR) holders;

2. one-time source data capture;

3. mechanized interface with other IDAFIPS subsystems to eliminate hard copy generation;

4. a standardized, highly responsive financial management system;

5. a single data base with daily updates and report generation and on-line inquiry capabilities;

6. interactive edit and validation at source of input. [Ref. 76]

The telecommunications interfaces to implement the IDAFMS OPFORCES system have not been determined at this time. Since a reduction of hardcopy transmission is one of the major driving forces behind IDAFIPS, an afloat telecommunications transfer system, as described in Chapter VIII of this thesis, warrants serious consideration.

The Financial Reporting System (FRS) is the third subsystem of IDAFIPS and it, too, depends very heavily on interfaces with IDAFMS. FRS will provide the vehicle to accumulate and prepare for transmission of financial data between FIPCs and from each FIPC to the next higher level of command it reports to. It is designed to operate on the

IDAFMS hardware located at the FIPCs and to reduce the labor intensive functions of today's system through on-line interactive processing, while eliminating some batch processing techniques. FRS is to provide the following:

1. reporting at the Department of the Navy (DON) level as specified by NAVCOMPT;

2. detail expenditure and collection data for processing by the Centralized Expenditure/ Reimbursement Processing System;

3. reports of funds expenditures and collections at the detail transaction level to Authorized Accounting Activities (AAAs);

4. automated cashbook processing for Disbursing Officers;

5. and overseas and afloat disbursing officer reporting. [Ref. 77]

FRS is to be an on-line entity that will increase the timeliness of reports and provide the capability for higher commands to do on-line inquiry of specific financial information of subordinate commands. It will also reduce the amount of hardcopy reports transmitted between commands through use of an IDAFIPS telecommunication network.

The final subsystem under IDAFIPS is the Claimant Accounting Module (CAM) which will be used by major claimants to process and summarize accounting data received from subordinate commands, via the IDAFMS and OPFORCES modules, for summarized reporting to higher authority. Major claimants using the IDAFIPS data base will be permitted to do on-line inquiry, update of files, and report generation. Each claimant will be supported by one of the

thirteen regional FIPCs. Since many of the major claimants and the FIPCs are not collocated, claimant interface to CAM will be via telecommunications.

In order to provide the kind of service that is to be provided by IDAFMS it was determined that a stand-alone computer system for each FIPC was required. A dual configuration of Burroughs B6900s was selected with associated B1900 remote batch terminal/printer and tape drives[53] at selected sites. [Ref. 77] Now that a computer system has been procured, the keystone to making the IDAFMS system work, once the applications are developed, will be the telecommunications system.

Since nearly all of the reporting of financial information in the past has been by hard copy or magnetic tapes and these methods were determined to be inadequate to implement the IDAFIPS system, a large telecommunications system has been called for in all the system documentation. Unfortunately, beyond statements that DDN will be used in the long run for long haul communications and Burroughs Network Architecture (BNA) will be used in the short run, the details as to what will comprise this IDAFIPS telecommunications network and how it will be implemented were not available at the time this research was being done. In light of this, the authors would like to explore ways in

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[53]It should be noted that the B1900 is one of the systems that NAVSUP was eliminating at the stock points through SPLICE.

which SPLICE could provide some portion of the telecommunications support required to handle the sharing of financial information at the stock points and for afloat units, as called for by IDAFIPS.

In the 13 regional areas where the B6900's will be located there will also be a SPLICE site in the same vicinity, if not in the same computer room. Since the majority of the B6900's will be located at SPLICE sites (i.e., NSCs who are FIPCs or NARDACs, which may operate the IDAFMS hardware), it is feasible that the SPLICE system could perform the following functions at IDAFIPS sites:

1. passing bulk files and individual transactions from UADPS-SP/SPLICE to the IDAFIPS B6900s through use of the SPLICE HYPERchannel network. Financial information to be passed would include that which is produced as material is purchased (i.e., from APADE on SPLICE), is received (i.e., from ABE on SPLICE), and is requisitioned from the stock points (i.e., from End-of-Day processing or applications E & F). Using such a facility, the SPLICE system would also be able to accumulate financial files or data to be added eventually to the IDAFMS data base, in an off-line mode (i.e., on a contingency basis when the Burroughs 6900s suffer hardware or telecommunications problems) and forward it to the Burroughs 6900s to be processed at a later time.

2. a gateway for the B6900's to the DDN and thus to other FIPCs and SPLICE sites around the country. This would release the B6900's from having to use capacity or a unique FEP to accommodate a separate DDN interface and would reduce Navy host access charges at processing sites.[54]

3. a FEP for Burroughs terminals requiring access to both UADPS-SP/SPLICE applications and the IDAFMS modules at stock points. Using the SPLICE Burroughs terminal

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[54]Current cost estimates for a host connection to DDN range between $2000 to $5000 per host per month [Ref. 78].

support capability, a single terminal on SPLICE in the hands of an authorized user could be made to have pass through capability to either the UADPS-SP or IDAFMS Burroughs systems by use of the Burroughs Pre-Processor Module to UADPS-SP and a similar module to be developed to link to IDAFIPS.

4. a connection point for local non-Burroughs terminals and users that are outside the immediate FIPC and that require (and are authorized) access to the IDAFMS data base. By providing this service, SPLICE could reduce terminal procurement costs and data communications line costs, while relieving the Burroughs IDAFMS system from having to handle some of its telecommunications overhead.

5. an alternative to procuring Burroughs B1900 RJE computers, particularly where these may have been planned for sites already designated as SPLICE MAPS RJE facilities.

6. the interface between NAVSCIPS and IDAFMS, eliminating the need to pass tapes between the systems.

7. the ICP interface to IDAFMS, using the SPLICE sites at these activities and SPLICENet/DDN to pass data to the SPLICE site collocated with the regional IDAFMS host.

8. the OPFORCES interface to IDAFMS, using the interface methods proposed in Chapter VIII.

9. the NIMMS U1100 application interface to IDAFMS, if and when the U1100 HYPERchannel interface is authorized.

The benefits that such interfaces would have to the corporation and the Navy at large are primarily financial: reduced telecommunications line and DDN host connection costs; reduced terminal procurement costs; and reduced tape handling and manual intervention costs. Additionally, space savings could accrue, in that single terminals at sites would be able to function in multiple processing environments. Finally, a means to accomplish an afloat unit

interface is provided, which appeared lacking or at least undefined, in the documentation reviewed.

The final area that will be addressed is how IDAFIPS and the proposed SPLICE objectives can be mutually supportive, thereby supporting previously presented corporate and project goals and strategies. The IDAFIPS efforts directly support and/or are supported by the following SPLICE project objectives: 12, 15, 16, 19, 22, 25, 27, and 34.

Since the interfaces proposed here between IDAFIPS and SPLICE do not currently exist, there is currently no way to migrate them to SPAR. However, unless the Navy wishes to continue with the awkward and antiquated tape passing of financial data, some methods such as those proposed above should be adopted to interface these systems. Whatever these methods are, they should then be carried forward to the SPAR modernization environment.

There are several recommendations the authors have for possible enhancements to IDAFIPS through interfaces to SPLICE that will enable them both to provide greater support and benefit to the corporation. These are:

1. Investigate the use of the SPLICENet/DDN as a primary means of transferring data and communicating between FIPCS, instead of separate IDAFIPS host DDN interfaces.

2. Investigate the use of the HYPERchannels to link the B6900's installed at the FIPCS with: the current Burroughs and SPLICE systems installed at the NSC's; the Burroughs, SPLICE, and Univac systems at the NARDACs; and the IBM/SPLICE connection at the ICPs to handle the transfer of the required financial information.

3. Investigate the use of SPLICE to provide the terminal connection for terminals requiring access to both Burroughs systems resident at the stock points and FIPCs, as well as utilize non-Burroughs terminals, and to provide for shipboard access to FIPCs as outlined in Chapter VIII.

This concludes the discussion of IDAFIPS. The next area to be discussed is IDA II(B) E.

D. INTEGRATED DISBURSING AND ACCOUNTING DX PHASE II(B) E

The IDAFIPS system discussed above is the long range plan for financial management in the Navy. Prior to IDAFIPS, NAVCOMPT had sponsored several prototype financial and accounting systems. One of these systems was developed by FMSO and deployed at various NAVSUP organizations, including the major stock points, under the banner of FMIP. Although deployed at these activities, the FMSO FMIP systems will be phased out under the IDAFIPS system. The exact timing of this phase out at the Navy stock points is uncertain, however, and until that time the FMSO developed FMIP modules must be supported. [Ref. 79]

One of the modules of FMSO FMIP is the Integrated Disbursing and Accounting Data Exchange Phase II(B)E (IDA II(B)E). IDA II(B)E is of particular interest to this work in that it is a transition candidate to SPLICE. As such, it must be carefully moved to the SPLICE hardware and interfaced to other stock point processes in the most efficient and effective manner possible.

The goal of the entire FMSO IDA program was to substantially reduce the time it takes to input, process, and output financial data at the stock points and through the entire disbursing and accounting systems. The phases of IDA previous to II(B)E accomplished such things as redirecting the flow of hard copy source documents from the Navy Regional Finance Center to the local AAAs,[55] innovations to processes that controlled payments of vendor bills and reimbursable billings, and improving check issue capabilities with mechanization of associated reports. All of these improvements were accomplished on the Burroughs mainframes and primarily in batch mode.

The batch orientation of the Burroughs hosts precluded any additional efforts at permitting on-line user access to the various accounting and disbursing files. However, to achieve its goal of timeliness in financial processing, IDA had to provide for on-line and interactive access to some of its files. Therefore, it was necessary to off-load many of the on-line/interactive processes to another host. In the absence of SPLICE, PE hardware and TAPS software were used.

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[55]An AAA (pronounced as "triple A") performs official accounting and disbursing functions for multiple commands within an area, mostly due to the fact that AAAs have ADP systems available to them. The area commands, usually referred to as Funds Accounting Activities (FAAs), retain the legal responsibility for their usage of their funds, with the AAA recording the results of FAA actions and processing payments which result from those actions.

The IDA II(B)E subsystem focused its emphasis on accounting processes at the AAAs and large FAAs. In this phase, selected accounting master files and transactions were to be extracted from the Burroughs hosts and made resident on PE hardware using TAPS. These files and transactions were then to be accessible by AAA and selected FAA personnel for immediate update, inquiry, and on-line error correction. Changes made to the off-loaded files would be applied to the Burroughs master files on a nightly basis, through PE file extracts and batch updating on the Burroughs system. Following completion of all other batch financial processing, selected Burroughs master financial file updates would then be applied to the downloaded files on the PE for further processing, again via tape extracts.

Once the files were loaded and PE application systems written in TAPS/COBOL, the key to this phase was providing on-line PE system access via available Burroughs terminals. More specifically, through the use of a FMSO developed terminal access and networking package (i.e., INS), users with Burroughs terminals, who in the past would have prepared financial input documents for key punching and batch processing in Application G[56] on the Burroughs could input these on-line on the PE.

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[56]Application G is the Cost, Allotment, and Appropriation Accounting application in UADPS-SP.

The users provided such access were at both the AAAs and selected FAAs.[57] At the AAAs, the system users had the capability to input and correct financial transactions for their activities and in behalf of those activities not receiving remote terminals in an on-line mode. The FAAs could only access their own files. Other normal Application G batch UADPS transactions still had to be processed on a periodic batch basis on the Burroughs.[58]

The impact of this system is that for the first time the AAAs and FAAs had direct access to the accounting files, giving them timely accounting and financial information. Additionally, the individuals who were responsible for transactions could input them themselves, thereby allowing immediate error correction and saving the time required for card preparation and waiting for the next batch process.

The Application G files to be extracted, downloaded, and updated by the transactions entered on-line on the PEs were the Transaction/Exception File, Job Order Reference File, Document Control File (DCF), Posting File, and General Ledger File. [Ref. 80] Outputs from Applications E/F[59]

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[57]The criteria for determining which FAAs received terminal hardware was existence of sufficient transaction volumes to justify the costs of terminals and printers.

[58]Application G type updates and corrections are normally card generated and run in batch mode on the late shift about three times a week.

[59]Application E is Financial Inventory Control and Application F is Stores Accounting.

could be also be input directly into the DCF processes being executed on the PEs. Transactions to these files could be recalled and corrected by the operators of the terminals anytime during the day.

Where then does SPLICE fit into IDA II(B)E? Following stock point wide implementation of the system, capacity, response time, and hardware problems plagued the PE and TAPS based systems. Once users became dependent on the system, these problems were unacceptable, and in the case of late vendor payments, costly in terms of missed discounts and interest or penalty payments. Although optimization efforts were continually undertaken by FMSO personnel to improve performance, three inescapable facts remained: the PE systems had no backup; they could not share resources in the event of minor failures, and there was limited surge, reserve, or expansion capability. SPLICE, then, was to resolve these problems.

As was mentioned in Chapter IV concerning NAVADS, the transition strategy from PE IDA II(B)E to SPLICE IDA II(B)E is to keep the transition as transparent as possible to the application by porting TAPS, in its updated TAPS II PASCAL form, to the SPLICE TANDEM system. Transition to SPLICE should only require current TAPS screens to be reimplemented in TAPS II, files moved to TANDEM ENSCRIBE format and interfaced to TAPS II, programs re-compiled into TANDEM COBOL and interfaced to TAPS II, and terminal device and

security functions placed under the control of the FDC's SAS/TMAP processes.

As was also previously indicated, the performance of TAPS II on TANDEM is poor today, and there are questions as whether sufficient optimizations can be made to make it usable in a production environment. The alternative, however, would be a complete re-design of the current system into the TANDEM native mode TPS using PATHWAY and ENCOMPASS, prior to any usage on SPLICE. Economic justification of this alternative would be difficult and would require continued PE and TAPS support during the duration.

The transition of PE IDA II(B)E to SPLICE will provide the corporation three of the four benefits that PE NAVADS transition to SPLICE did: a reduction in non-SPLICE minicomputer system support; non-stop support for the accounting function; and a reserve, expansion, and growth capability for the application. See the NAVADS benefits paragraphs in Chapter IV for further elaboration on these points.

Assuming the transition of IDA II(B)E to SPLICE, there is no need for migration of IDA II(B)E to the SPAR transition environment. The SPLICE terminal and process-to-process interfaces to SPAR will, however, also be required to interface to the other host Application G processes that will be transitioned in their current form to the new hardware. When SPLICE is replaced by modernized SPAR, the

SPLICE portion of IDA II(B)E should not require migration, in that IDAFMS should be implemented at the stock points by that time.

The final area that will be addressed is how IDA II(B)E tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. IDA II(B)E directly supports and/or is supported by the following SPLICE project objectives: 12, 15, 16, 19, 22, 25, 27, and 34.

The following recommendations should be evaluated by the IDA II(B)E and SPLICE projects to assist in the further attainment of corporate and project goals and objectives:

1. When IDA II(B)E is implemented on SPLICE, replace the current tape file uploads and downloads with a HYPERchannel bulk file transfer interface.

2. Ensure that SPLICE IDA users are afforded Burroughs Pre-Processor access, to enable them to use other Application G Burroughs screens updates and inquiries from their SPLICE based terminals.

3. Investigate the use of SPLICE to provide the other FAAs IDA II(B)E access through use of dial-in lines and intelligent terminals/PCs using a TANDEM or Burroughs terminal emulation package.

4. When economically justified, replace the less functionally capable Burroughs terminals with either TANDEM or IBM 3270 series terminals.

5. Investigate the distribution of IDA II(B)E local management reports via TANDEM TRANSFER or PS Mail, thus reducing hardcopy and paper requirements.

6. Develop a plan to transition the IDA II(B)E application off TAPS II entirely to native mode TANDEM PATHWAY/ENCOMPASS.

7. If additional Burroughs capacity relief or downloads are desirable, investigate the download of IDA IIA to SPLICE. There appears nothing in this subsystem which mandates its processing on the Burroughs. If accomplished, this would return capacity to the Burroughs, improve the stock point check issue and disbursing reports facilities, is a natural co-process to the SPLICE APADE application for procurement initiation and SPLICE ABE for receipts, and will reduce SPAR transition requirements.

8. If it appears that the IDAFIPS implementations at the stock points will be further delayed, investigate interim interfaces between FMSO IDA (i.e., Burroughs and SPLICE resident) and IDAFIPS using SPLICE systems as the gateway for terminals, processes, and file transmissions.

This concludes the discussion on IDA II(B)E. The NAVSCIPS interface will next be addressed.

E. NAVY STANDARD CIVILIAN PAYROLL SYSTEM (NAVSCIPS)

The NAVSCIPS is to be the standard DON payroll processing system. The Navy currently has seven "standard" and four unique systems to pay civilian employees, emanating from multiple CDAs and local activities. The Navy is the only service that has not implemented a single standard payroll system and to correct this shortcoming, NAVCOMPT has chosen NAVCOMPTSSA as the CDA to develop NAVSCIPS and directed that it be implemented Navy wide.

NAVSCIPS is to be located and operated at designated FIPCs and Financial Processing Centers (FPCs), many of which will be collocated with SPLICE sites. NAVSCIPS must interface with other existing systems as well at these and other remote sites. The need for existing system interfaces stems from a nebulous requirement for major claimants to

develop "interface programs required to provide standard inputs and process standard NAVSCIPS outputs" [Ref. 81].[60] The following other Navy information systems are specifically designated as requiring a NAVSCIPS interface:

1. IDAFMS
2. SYMIS
3. Standard Automated Financial System (STAFS)
4. Naval Ordnance Management Information System (NOMIS)
5. NAVAIR Industrial Financial Management System (NIFMS)
6. Navy Civilian Personnel Data System (NCPDS) [Ref. 82]

It should be noted that no NAVSUP system interface is called for, leaving both the NAVSUP T/A source data capture requirement and the NAVSCIPS output to NAVSUP input process problems unaddressed.

Having received T/A inputs from these other systems, NAVSCIPS will provide standard and enhanced pay processing features and capabilities such as:

1. complete validation of T/A and record maintenance inputs;
2. identification of missing T/A records for a period;
3. automated pay, leave, and time history records;
4. automated retroactive pay and leave processing;
5. an automated document control system;

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[60] The best information that the authors could obtain indicates that the inputs are T/A data from other system mechanized processes or source data automation efforts.

6. automated maintenance of the SF 2806 Retirement Record;

7. standard interfaces with financial management information systems and the NCPDS;

8. some reconciliation of pay to labor data;

9. automated management reports on overtime and leave usage;

10. and a report generator capability. [Ref. 83]

The Navy chose a PE 3210 system as its standard hardware suite for NAVSCIPS, obtained from the Navy Minicomputer Contract with C3, Inc. NAVCOMPTSSA sizing efforts have indicated that a larger computer than the PE 3210 will be required for NAVSCIPS at (at least) five of the required implementation sites. No indication of how these larger systems will be procured has been provided. The main applications programs supporting NAVSCIPS will written in COBOL or FORTRAN, using the SEED data base management system and supporting development tools. [Ref. 84]

The foreign system interfaces to NAVSCIPS, both in terms of input and output, are loosely stated by the CDA to be magnetic tape and hardcopy or computer formatted reports. Within NAVSCIPS itself, terminal entry will be the major source of input, with terminals connected to the NAVSCIPS PE directly.

There are three areas where the integration of NAVSCIPS and SPLICE at the stock points sites could be of benefit to the corporation. First using the NSC Norfolk local SPLICE PPS discussed in Chapter V, SPLICE could develop a standard

T/A input process to NAVSCIPS for use at all stock points. This would eliminate the need for multiple local uniques to accomplish the same task. At the same time, this could eliminate some keypunching and card-to-disk processing required today for payroll processing, if such an approach were tied to the stock point SPLICE interim office automation efforts.[61]

Secondly, a PE HYPERchannel interface could be used to provide interface among NAVSCIPS PEs and several of the required foreign interface systems, including SPLICE. This high speed data/computer interface could be used in lieu of tape file transfers, could permit SPLICE terminals to access NAVSCIPS processes without the need to procure additional terminals, and permit the transfer of NAVSCIPS output products directly to other systems without the need for hardcopy document preparation. Such an approach would reduce land line telecommunications costs, terminal procurement costs, and manual output handling costs.

Thirdly, the NSC Norfolk EFT process could be adopted, documented, and used as a Navy standard civilian payroll interface to the Federal Reserve System. Selected SPLICE sites could be used as gateways to the FRBs for all of

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[61]In this scenario, the authors envision local stock point division administrative personnel inputting T/A data received from stock point employees directly on SPLICE terminals on a daily basis. Following supervisor on-line approval, site consolidation and forwarding of T/A data to the NAVSCIPS system would be undertaken on whatever periodicity is required.

NAVSCIPS, eliminating need for each NAVSCIPS user to develop its own interface or use manual tape handling to accomplish EFT interface requirements.

The next area to be addressed is the NAVSCIPS need for migration to the SPAR environment. NAVSCIPS can be seen as outside the sphere of SPAR transition and modernization. Therefore, SPAR migration would be a non-issue. However, the source data input requirements to NAVSCIPS and output product integration requirements into other stock point processes are real issues. SPLICE can accommodate these requirements during the SPAR transition phase. SPAR itself will have to address these requirements in its modernization phase.

The final area that will be addressed is how a NAVSCIPS and SPLICE integration effort would tactically support the NAVSCIPS project and proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. The NAVSCIPS-SPLICE interface directly supports and/or is supported by the following SPLICE project objectives: 12, 15, 19, 21, 22, 27, and 34.

The following recommendations should be evaluated by the NAVSCIPS and SPLICE projects to assist in the further attainment of Navy corporate/project goals and objectives:

1. Task SPLICE to provide a standard stock point payroll T/A input data application for the NAVSCIPS PE systems.

2. Investigate the use of SPLICE to perform the EFT service to the FRBs as a standard output process

from NAVSCIPS. SPLICENet could also be used to assist in distributing EFT inputs to SPLICE sites which would perform a gateway service to FRBs.

3. Investigate the use of the SPLICE HYPERchannel as an interface to NAVSCIPS to permit on-line input passing, sharing of terminals, and output report distribution.

4. Investigate the use of SPLICE as an alternate NAVSCIPS hardware suite, for sites where the PE systems are anticipated to have capacity problems. This recommendation is contingent on the ability of the SEED DBMS products being implemented on SPLICE, in a manner similar to the way TAPS II was transitioned on SPLICE.

5. In the event that recommendation number 4 is not feasible, expedite the movement of NAVADS and IDA II(B)E to SPLICE hardware and excess the larger NAVSUP PE systems currently used by these applications to NAVCOMPT for use by NAVSCIPS.

This concludes the discussion of NAVSCIPS and this section on financial and procurement/contracting systems. SPLICE shorebased interoperability is the next area that will be considered.

VII. SHORE BASED INTEROPERABILITY

A. CHAPTER OVERVIEW

For the purposes of this document, interoperability is defined as the ability of multi-vendor ADP hardware and software systems or components to communicate [Ref. 85]. Within the DOD, interoperability is mandated due to a diversity of vendor products used by DOD which must be interfaced.[62] This chapter will address how SPLICE assists NAVSUP is meeting its requirements to support interoperability in three areas: terminal connections, intra-site connections, and inter-site connections.

B. TERMINAL CONNECTIVITY

For the first decade that UADPS-SP resided on Burroughs hosts, terminal (i.e., CRTs and printers) connectivity had not been an issue: no Burroughs terminal meant no connectivity to the Burroughs systems. This was primarily due to three things: Navy use of the Burroughs Poll/Select protocol and data formats; ease of obtaining Burroughs terminals off existing Navy-Burroughs contracts; and the inability or lack of desire of third party vendors to produce competitively priced Burroughs compatible terminals.

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[62]This diversity of products within the logistics community is due primarily to ADP open market competition.

As NAVSUP began its move into a CRT/remote printer oriented environment at the stock points, particularly on PE minicomputers, and pressures for competitive procurements mounted, additional sources of Burroughs compatible devices were found available under "brand name or equal" procurements. Contracts were given to alternate sources resulting in a proliferation of Burroughs "work-alike" CRTs (e.g., DATAMAX, Delta Datas, ADM-31s, etc.).

As time progressed, Burroughs compatible and even early Burroughs terminal devices were found not always to be 100% compatible with Navy unique software, particularly as Burroughs made changes to its protocols. Upgrades (i.e., replacement of chips or new firmware) were required to existing terminals, often free if Burroughs had provided them and not so when obtained from third parties. Additionally, projects began to request greater functionality (e.g., multiple function key support, large amounts of terminal memory, etc.) than the older Burroughs terminals or compatibles supported. The need to accommodate other terminal devices and protocols was realized.

These events influenced NAVSUP to require multi-vendor terminal and protocol support within the SPLICE procurement. Due to the large inventory of Burroughs and compatible terminals at the stock points, both CRTs and remote printers, SPLICE would not only require full support for existing Burroughs devices, but would also require support

for a series of compatibles and a range of non-compatible devices, most noteworthy being those manufactured by IBM and IBM compatible devices.[63] A summary of Government Furnished Equipment (GFE) terminal devices which were listed in the SPLICE contract [Ref. 86] is provided below:

1. Burroughs and Burroughs compatible CRTs and remotely addressable printers;
2. IBM 3270 series devices;
3. IBM 2780/3780 data communications protocols;
4. and Asynchronous, block/forms mode CRTs.

Conspicuous by its absence, is required support for PCs.

The words "terminal support" are nebulous. If one can physically connect a device to the system is that support? Is protocol support required? What if only some terminal operating modes are available? Must one be able to run at least some or all system supported and application software? The answers to these questions determines the level of foreign terminal support a system provides.

To ensure there were no misunderstandings in this critical area, three requirements were specified for "terminal support" in the SPLICE procurement:

1. Government furnished data communication equipment identified . . . shall be interfaced. Data communications equipment operation shall be provided in both asynchronous and synchronous communications modes configured on both point-to-point and multipoint lines within the same SPLICE configuration. The

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[63]With IBM or IBM compatible terminals representing approximately 70% of the terminal market, this step appears justified.

Contractor provided system functions available to a system user shall be available from any data communications equipment which has facilities for inputting and outputting the necessary characters, in any of the communications modes and line configurations. [Ref. 87]

2. The conversion of received and transmitted data shall be provided such that the applications software shall be independent of terminal or data communications line characteristics.

3. Data Communications Network Software shall provide for full utilization of all features of the terminals [Ref. 88].

These criteria were to provide for use of all native mode terminal capabilities, in all operating modes and configurations, requiring all system software and applications to fully function as if dealing with a vendor terminal, and to do so without application software or configuration changes. Vendors were required to demonstrate portions of this support at the SPLICE benchmarks.

The winning vendor, FDC, was able to demonstrate full compliance with the SPLICE specifications at the benchmarks, in terms of the "letter of the law." TANDEM off-the-shelf hardware and software provided physical connectivity, protocol support, as well as higher level TANDEM product interface for TANDEM terminals and IBM devices. FDC provided software to perform data format mapping and interface to higher level TANDEM products offerings for "dumb" asynchronous block/form mode and Burroughs devices.

FDC was also concerned enough about the SPLICE project and the many initiatives that it had to support in an

operational environment to inform the government at that time of deficiencies in their demonstrated package that would require extensive revisions to meet all the "spirit of the law" requirements. The software package which resulted from this re-write, which was performed at no cost to the government, is today called TMAP.[64]

Specifically, TMAP supports the following functions for government furnished terminal equipment:

1. supports hardware interface and communications level protocol for GFE terminals in various point-to-point and multipoint configurations;
2. provides an operating mode which allows block mode applications written in PATHWAY to treat GFE terminals as if they were TANDEM 6530 terminals;[65]
3. provides an operating mode which allows conversational or teletype access to the Command Interpreter, FUP, EDIT, etc.;
4. provides an operating mode which allows access to GFE printers by the TANDEM SPOOLER;
5. supports virtual function key support for GFE CRTs;
6. and performs the above in a manner which makes the terminal type transparent to the application program.

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[64]In that TANDEM and IBM terminals are supported completely with off-the-shelf products and there are so few of these currently in the stock point inventory, government interest has focused most closely on TMAP. This interest will remain high as other terminals from the remainder of the BUNCH (i.e., Burroughs, Univac, NCR, CDC, and Honeywell) must be interfaced to SPLICE.

[65]Although FDC documentation states TANDEM 6530 emulation is provided, due to limitations on the Burroughs CRTs, TANDEM 6510 terminal emulation appears closer to what is being provided.

There was sufficient functionality provided here to permit implementation of immediate application packages at the stock points using previously procured Burroughs and compatible devices, as augmented by SPLICE procured TANDEM 6530 terminals. [Ref. 89]

As a part of the recently accepted FDC SPLICENet proposal, TMAP functionality will be transitioned to a new FDC product for TANDEM called the Communications Control Process (CCP). A copy of CCP will reside in every SPLICE system at a site under the control of a site Communications Environment Manager (CEM). Within CCP are vendor unique terminal handling processes called Terminal Initialization (TERM INIT) processes. Four TERM INIT processes are currently recognized by FDC as being required: IBM 3270, IBM SNA, Burroughs, and Honeywell. [Ref. 90]

Future stock point processing will require the incorporation of intelligent workstations or PCs onto SPLICE (i.e., APADE). IBM PC or compatible PC support can be provided under SPLICE in four ways:

1. The government can procure TANDEM DYNAMITE workstations, which are IBM compatible PCs.

2. PCs may be interfaced to SPLICE systems as TANDEM 6530 terminals via third party terminal emulation packages, such as the Microgate 6530 board/software. Using the Microgate 6530 product, in addition to terminal emulation, a data file upload and download software package, with format translation, is available (FLASH).

3. TANDEM itself supports a PC interface package called PC LINK, usable with the 6100 communications subsystem.

4. TANDEM has announced support for a PC LAN interface, which will include the capability for PCs on a Local Area Network (LAN)[66] to emulate TANDEM 6530 terminals. Additional support includes the ability of PCs on the LAN to use TANDEM disk storage as a local PC drive (FILE SERVER), and share printers (PRINT SERVER). Many command interpreter commands to the TANDEM systems may be entered in PC formats with the TANDEM system making required conversions to TANDEM formats.

Although the authors were unable to locate SPLICE contract modifications including any of these products, SPLICE system users are planning to obtain many of these products (i.e., NSC Pearl Harbor). All these products could be provided under the SPLICE contract substitution clause.

The benefits that the corporation receives from SPLICE supporting terminal interoperability are fourfold:

1. SPLICE can introduce new applications to the stock points, including new functionality in the interim to SPAR, while protecting the existing terminal base. This allows for phased terminal augmentations or enhancements, selective terminal replacement as devices reach obsolescence, and greater time periods over which to extend replacement costs.

2. SPLICE allows terminal replacement contracts to be more functional vice vendor product or interface specific. This enables greater competition in the procurement process and should result in lower terminal replacement costs.

3. SPLICE allows a single terminal to access multiple collocated or remote hosts, with the SPLICE system handling protocol and data format conversions and permits multiple uses of a terminal on the same host (i.e., word and data processing). This reduces required outlays for multiple terminals when multiple

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[66] Advance product announcements indicate support for any LAN product using the "NETBIOS" standard and which provides PC hardware/software to connect to the network. Planned support includes: IBM TOKEN Ring, STARLAN, PC-Network, Ungermann-Bass ETHERNET/OSI and ETHERNET/TCP-IP.

incompatible host access or single host multifunction usage is required.

4. SPLICE's ability to use multiple vendor terminals to access TANDEM resident applications and applications on IBM or Burroughs hosts will permit a phased terminal transition to SPAR without having to disrupt the communication network or have to perform a massive replacement of older terminal devices immediately.

These benefits have both monetary and risk reducing aspects.

There appears to be no need to migrate terminal interoperability from SPLICE to SPAR. By the time SPLICE is replaced by SPAR in the 1990s, all stock point terminals will have been replaced with SPAR compatible devices. More importantly, the SPAR single vendor support concept and reluctance to use environmental software developed uniquely for the Navy would preclude migration of this function simply to further system interoperability. DDN must be made to provide required terminal interoperability for SPAR.

SPLICE terminal interoperability supports the following proposed SPLICE project objectives: 1, 12, 13, 15, 16, 19, 23, 29, 32, 33, 34, 35, 41, 44, 49, and 50.

The authors have five recommendations to improve SPLICE support for terminal interoperability:

1. Investigate the inclusion of Univac CRTs and Data General CAD/CAM terminal devices under TANDEM physical and protocol support and FDC CCP/TERM INIT support.

   a. The NARDAC U1100 systems will often be collocated with UADPS-SP Burroughs/SPLICE systems. Permitting Univac terminals (i.e., UTS 20, UTS 30, UTS 40, and SperryLink devices) on SPLICE to access both UADPS-SP applications and U1100 applications (i.e., Naval Air Rework Facility applications) may reduce the numbers of terminals required for users to perform their work, reduce local

telecommunication line costs, and increase the range of potential future terminal replacement vendors.

b. The EDMICS interface to SPLICE may be possible by supporting the Data General CAD/CAM terminals on SPLICE hosts via a pass-through mode to the EDMICS hosts. This interface would be similar to what is done today in EM3270 for TANDEM terminals to work with IBM hosts.

2. Expand the scope of CCP support to include additional printers, including laser printers for APADE, ABE, LOGMARS, and NISTARS. At a minimum, those devices used today in NISTARS should be addressed. Additionally investigate the incorporation of large volume laser printer support (i.e., Xerox 9700) either through direct connection to SPLICE system, through HYPERchannel (type A or B) or HYPERbus connections, or data communications.

3. Review the functional descriptions of the TMAP replacement products in light of the SPLICE contract terminal requirements. It is unclear to the authors if full function support for dumb block/form mode asynchronous devices is available under TMAP today or will be provided under CCP (i.e., no TERM INIT process identified). Either the contract or the proposal may require change.

4. Ensure that dial-in support for intelligent terminals/PCs is addressed under CCP and SAS, including a file upload/download facility.[67] Physical security requirements for dial-in support should also be re-examined.

5. FDC should be tasked with including local area PC and terminal network support under SPLICENet. PC networks may be the basis of interim OA at the stock points and NAVSUP already has prototype local area terminal networks in place, which may not be compatible with SPLICENet (i.e., NSC San Diego PLANet).

This concludes the discussion on terminal interoperability. The topic of SPLICE support for intra-site interoperability will next be discussed.

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[67]This area must be addressed in support of shipboard users not having direct connect SPLICE access.

C. INTRA-SITE INTEROPERABILITY

Intra-site interoperability within SPLICE is planned to be accomplished in three ways: TANDEM-to-TANDEM local interconnection; the LCN interconnection, and data communications interconnection. Each of these methods will be addressed to show how it accomplishes intra-site interoperability. Following this, the benefits, SPAR migration need, proposed SPLICE objectives, and recommendations for improvements in this area will be provided.

1. TANDEM-to-TANDEM Interconnection

With the definition of interoperability provided at the beginning of this chapter, one might ask: why discuss TANDEM-to-TANDEM interconnection? Isn't that a single vendor situation? Surprisingly, the answer is no.

A SPLICE TANDEM system will consist of from 2 to 16 processors. A single SPLICE site (i.e., NSC Oakland) may have several 16 processor SPLICE systems. Should these be interconnected? If so, what is the best way to interconnect them: via TANDEM products or via the LCN? Additionally, a stock point may have a Sperry Univac provided TANDEM Non-Stop II system for NISTARS which need not be configured to account for or operate with SPLICE. The issue of connecting multi-vendor TANDEM configurations must also be addressed.

The authors contend that all SPLICE systems at a site should be interconnected via TANDEM products. This

provides for the greatest possible spread of processes and files across available assets, should facilitate multiple application tuning efforts, and provides additional contingency resources without reconfiguration. However, there are also performance factors in this contention.

The TANDEM host interface product, EXPAND/FOX, is preferred over the non-TANDEM LCN due to effective data transfer rate considerations and processing software considerations. An effective data transfer rate of 1 megabyte/second (per cable with up to four cables) [Ref. 91] can be attained through TANDEM off-the-shelf products while only a 300 kilobytes/second burst rate [Ref. 92] is achievable through the LCN (TANDEM HYPER Link) interface controller. Additionally, the TANDEM EXPAND software has been specifically incorporated into and optimized for the operating system, while the LCN software, NETEX or TABU, is essentially an application add-on.

The authors have already taken the stand in discussing the NISTARS-SPLICE interface that the two configurations at a site should be interconnected. Besides the application integration advantages from doing this, backup and contingency concerns drive this recommendation. The question of how this should be accomplished, physically and with what software, remains to be addressed.

The recommended means to provide TANDEM-to-TANDEM system interface intra-site, regardless of the physical

media, is through a bundled software extension to the TANDEM operating system called EXPAND. This operating system extension enables systems which are not connected via the DYNABUS[68] to operate as if they were a single system without application program changes. The methods used to accomplish this, along with product features and components, are described in [Ref. 93]. For the purposes of this document, it is only important to note that EXPAND permits:

1. a process on one node to access and use resources, including files, on other nodes;

2. users on any node to access processes or data on any other node, subject to security constraints;

3. a process on one node to send or receive transactions to and from a process on another node;

4. and guaranteed end-to-end data integrity and notification to the sending process of delivery failure.[69]

All of these capabilities are of use in intra-site, NISTARS TANDEM-to-SPLICE TANDEM interconnection.

Physically, the EXPAND software can use any of four media to complete system interconnection: direct connect, fiber optic cables, X.25 lines, or satellite transmissions. Only the former two are of interest in the area of SPLICE intra-site connectivity due to the cost and distance involved. The authors purpose that SPLICE TANDEM-to-

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[68]The DYNABUS is a high speed inter-processor communications bus for single TANDEM systems (i.e., up to 16 processors)

[69]"Guaranteed" delivery is not provided, although this too can be provided via an interface to TRANSFER.

NISTARS TANDEM interconnection be accomplish preferably via the TANDEM EXPAND/FOX fiber optic subsystem (FOX), where the distance between systems is less than 1 kilometer and sufficient slots can be found to support the FOX controllers on all systems. The lesser preferred alternative would be interconnection through EXPAND/Direct Connect links, using the highest speed, best grade data lines available at a site (up to 56 kilobytes/second).

2. The LCN Intra-site Interconnection

SPLICE systems will be collocated with non-TANDEM systems. These non-TANDEM systems include IBM, Burroughs, Univac, and PE systems. The need to interface these systems for transaction and bulk file passing appears to exist.

Two basic concepts of SPLICE have always been that all computers collocated with SPLICE would be interconnected to each other and SPLICE via the LCN, and that off-the-shelf software would be used to support the LCN. In accordance with the SPLICE contract, this would mandate use of Network Systems Corporation HYPERchannels and Network Executive (NETEX) software. To date, neither of these concepts has been exploited within SPLICE, although the SPLICENet proposal re-affirms the latter. Current SPLICE LCN initiatives support the intra-site interconnection of only

TANDEM and Burroughs systems and this is done through Navy developed software.[70]

The reasons for these deviations from original SPLICE plans are varied. First, consider non-ADP issues:

1. NAVDAC has never approved a SPLICE-U1100 interface via the LCN. This is the case in spite of: the UADPS-SP Burroughs to NIMMS (U1100) interface requirement,[71] a similar NARDAC New Orleans HYPERchannel project exists, and general NARDAC NARF support were the driving forces behind the original requirement.[72]

2. FMSO application development personnel were not brought into the planning process. NAVSUP application support (e.g., FMSO developed PE IDA) was the rationale for a SPLICE-PE interface, particularly in the area of transaction passing to the Burroughs and bulk file transfers to eliminate tape handling at stock points. Once the SPLICE contract was in place making development of these interfaces possible, it was FMSO application personnel that claimed there existed no need for such an interface since existing tape passing was working and application changes and costs to implement the changes outweighed benefits.

3. Inability of disparate projects to acknowledge and accept areas of overlap. In many of the stock points the SPLICE, IDAFIPS, and NAVSCIPS systems will be within LCN connection range. No plans exist to connect these. SPLICE sites at the ICPs will be

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[70]With the exception of the SPLICE Computer Operations Manual, all FMSO and FDC SPLICENet documentation held by the authors discusses the NETEX software as being used to support SPLICE HYPERchannel operations. The best information obtainable by the authors is that TABU, the Navy developed HYPERchannel software, is being used and will continue to be used in lieu of NETEX on the Burroughs systems.

[71]This interface is accomplished today by a PE minicomputer which is used to do little more than pass transactions between Burroughs and Univac hosts.

[72]No response was received to letters written to NAVDAC requesting clarification on this issue.

connected to IBM 3080/3090 series systems via data communications (i.e., SNA).[73]

Second, consider the following ADP related issues:

1. SPLICE LCN software requirements within the contract called for interconnection software that meets ISO OSI standards for interconnection [Ref. 94]. This is so despite the fact that two SPLICE sponsored studies at NPS Monterey indicated this would be unnecessary overhead and it would adversely affect host/LCN performance. [Refs. 95 and 96].[74]

2. The preliminary deliveries of Burroughs NETEX confirmed the performance problem cited in the studies since the software could only be run on larger Navy Burroughs systems and then only at the sacrifice of some application processing. Therefore, the Navy developed their own HYPERchannel software for the two immediately required systems (i.e., TABU). The authors anticipate that similar capacity and performance problems will exist on smaller PE systems.

3. Off-the-shelf NETEX software does not provide all the functionality required (i.e., layers up to and including presentation) in the SPLICE contract. FDC was required to supplement it with additional software. This required development time after delivery of acceptable lower level software products and would not meet Navy implementation schedules. This area too is under re-design in SPLICENet.[75]

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[73]The rationale for this is unclear to the authors. Explanations from lower level FMSO personnel include that HYPERchannel is not recognized as an "IBM strategic product" and the interface would require the use of "Navy unique software" to implement.

[74]To obtain off-the-shelf software in the contract it was necessary to specify some standard. The ISO OSI standard was the only one seen as available/applicable to the SPLICE system, including the LCN.

[75]The SPLICENet proposal indicates that a SNA like hierarchy would be established for HYPERchannel/NETEX usage. A CCP would control LCN usage through Communications Interface Packages (CIPs) on each background host processor. These CIPs interface to HYPERchannel via NETEX. When a CIP-to-CIP session is required, the CCP accomplishes it.

The use of the Navy developed HYPERchannel software in SPLICE for TANDEM and Burroughs has thoroughly proven the concept of high speed inter-computer communications for interoperability within the stock point environment. Previously, the REP FILES and TRANSRECON Offload applications were discussed supporting this. The other major proof of this is found in the Navy developed Burroughs Pre-Processing module on SPLICE.

The Burroughs Pre-Processing module permits: 1. users on SPLICE terminals or processes to obtain access to a pass through application; 2. creation/storage/presentation of TANDEM screen images of Burroughs frames for optional use; and 3. passing of SPLICE generated standard Burroughs transactions to on-line Burroughs programs or queues. Once in the pass through application, inputs are passed out of SPLICE, through the HYPERchannel, and to the Navy Burrougns data communications manager (SDCH), while Burroughs outputs are passed back via a similar path to input CRTs, remote printers located on SPLICE, or may be inputs to holding files or other processes. When the Burroughs systems are down, Burroughs destined inputs are stored for future passing to them. Unexpected Burroughs generated transactions may also be passed to SPLICE via this module and forward to SPLICE processes/files. [Refs. 97 and 98]

The authors found no documentation concerning a Navy unique implementation of a bulk file transfer module using

the HYPERchannels and TABU. Although such development is well within FMSO's capability, it appears that future NETEX releases may be used to fill this role, eliminating the need for further Navy unique development.

3. Data Communications Interconnection

In light of the failure of the LCN concept being exploited, some stock point intra-site computer connectivity will still require data communications interfaces. In these situations, SPLICE can perform the required interface function for terminal users and processes.

In chapters IV through VII, some of the NAVSUP applications requiring intra-site data communications interface are discussed. Specifically, these are FMSO IDA, NAVADS, NISTARS, and On-Line AUTODIN (OLA).

FMSO IDA, NAVADS, and OLA are planned to transition to SPLICE, therefore, no effort appears necessary to interface their current data communications requirements to SPLICE.[76] These transitions to SPLICE also obviate the need for the PE LCN interface entirely within NAVSUP. NAVSCIPS and NIMMS still present unresolved PE interface problems.

Recommendations were previously made to eliminate the NISTARS-to-Burroughs data communications interface and replace it with direct TANDEM-to-TANDEM connections. The FDC SPLICENet proposal specifically addresses the EXPAND/FOX

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[76] If it were necessary to do this, the current NAVADS-to-NISTARS data communications interface could easily be incorporated into SPLICE.

interface required in this case and alludes to the alternative EXPAND/Direct Connect interface as an exception for MAPS RJE site processing. To accomplish the NISTARS-SPLICE interface, this exception may be the rule due to distance between systems.

Outside of Burroughs-to-Burroughs terminal concentrator and RJE intra-site data communications, which can be eliminated by moving terminals and processing directly over to SPLICE, there is only one other firm intra-site data communications interface required: IBM-to-SPLICE/Burroughs. This interface is required in support of the TRIDENT LDS, but will also apply to the ICP Resolicitation system interface. These systems prefer standard System Network Architecture (SNA) SPLICE interface over HYPERchannel interface.

The TRIDENT LDS system has recently been transitioned from PE equipment to IBM 4300 series hardware/software obtained off the ICP Resolicitation contract. Part of this transition required the replacement of the previous TRIDENT LDS-to-UADPS terminal and process data communications hardware and software interfaces, which were called collectively the NCP. NCP resided on PE hardware and connected local PE systems to remote Burroughs systems for transaction passing, while simultaneously permitting terminals on it to access either system. When the Burroughs host which supported a portion of TRIDENT LDS

was moved to the TRIDENT Refit Facility (TRF), Bangor, the need to interface a Burroughs host collocated with an IBM host through data communications was recognized.

FDC was able to accomplish this through a combination of TANDEM, IBM, and third party software. Three situations had to be accommodated:

1. a user requiring access to data/processes on either the IBM or Burroughs system on a regular basis;

2. a user on the IBM system requiring infrequent access to the Burroughs system;

3. and an application on IBM sending transactions to an application on Burroughs, and vice versa.

Situation number one was accommodated by placing the bi-directional terminals on SPLICE. Terminal access to Burroughs was provided via the SPLICE Burroughs Pre-Processor and related hardware/software. IBM access[77] was provided by installing on the TANDEMs: EM3270 to make TANDEM terminals able to emulate IBM 3270 terminals;[78] direct support of IBM terminals on SPLICE; SNAX which provides the SDLC link level protocol required to interface to the IBM

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[77]Assumes an IBM host running MVS or MVS/XA, ACF/VTAM, and CICS or other LU 6.2 software.

[78]The authors are making the assumption that Burroughs terminals emulating TANDEM 6530s via the FDC TERM INIT/Burroughs software (old TMAP) can be interfaced to EM3270 to enable IBM system usage. If this is not so, much of the existing Burroughs terminal base is in jeopardy and one of the basic tenants of the SPLICE contract (i.e., full support for Burroughs terminals) has been discarded. This capability is considered critical.

host [Ref. 99],[79] and 3. SNAX High Level Support (SNAX/HLS), which provides Transmission Control services required by SNA. To begin use of the IBM system from a SPLICE terminal, the user must self-initiate the session with an initiation and logon request, indicating the line leading to the IBM host and the name of the IBM host application that is to process the logon request. SNAX then initiates the session. From there, normal IBM processing continues.

The second situation is more complicated. In addition to the products already assumed on the IBM and TANDEM, several other products are required. A product called Host Command Facility (HCF) is required on the IBM system. User logon to this product permits terminals on the IBM system to interface, through VTAM/SNAX/SNAX HLS, to a FDC provided TANDEM process called DHCFNET. To do this, the IBM user must execute the HCF software and then input an ACQUIRE command, followed by the SNA logical unit (LU NAME) assigned to the terminal. DHCFNET performs mapping functions and interfaces to the FDC SAS system. After a short period of time following presentation of a FDC welcome message, the user is "pushed" the SAS logon screen, from

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[79]The TANDEM SNAX product includes a PASSTHROUGH function. This function permits an IBM host application program to communicate with TANDEM connected SNA compatible devices as though they were connected to a host cluster controller. The function is enabled by configuration and startup procedures, vice software enabled.

which Burroughs Pre-Processor may be selected for further processing on the Burroughs host. [Refs. 100 and 101]

The third situation is accomplished by adding yet an additional product to the TANDEM for interface to provide LU 6.2 interface to the IBM side: SIXTWO [Ref. 102]. Although no specific references were found describing the actual processing scenario being used at TRF, the authors can provide a summary of how processing can be accomplished.

The SIXTWO product on TANDEM allows SPLICE applications to pass transactions to and receive transactions from LU 6.2 programs on the IBM, by providing the required port to the SNA network. Normal SNA services, such as Transmission Control, Data Flow Control, Logical Unit Network Services, Resource Management Services, Presentation Services, and Control Point services are provided by SIXTWO which interfaces to SNAX using SNALU. Transaction programs on both IBM (i.e., CICS/TAPS applications from TRIDENT LDS) or TANDEM (i.e., PATHWAY applications accepting requests for/from Burroughs Pre-Processor) can both make calls on SIXTWO. SIXTWO initiates all required session services on behalf of the two parties wishing to pass data, and when both processes are on-line, permits a pass through of the initiator's data to the reception point. After acknowledgement of receipt, the session may be terminated.

The basic principals of this SNA interface between SPLICE and IBM have been incorporated into the new FDC SPLICENet proposal. This interface is described as a "gateway interface", and pre-supposes NETEX instead of TABU for the Burroughs connection. A similar interface may be implemented at both Navy ICPs under Resolicitation for stock point access to ICP programs and files (i.e., ICPNet).

Having discussed the three ways in which intra-site interoperability will be provided for under SPLICE, what benefits which can accrue from their implementation? In terms of TANDEM-to-TANDEM intra-site interface, application integration, resource sharing, and backup/redundancy are all potential benefits. The benefits the LCN interface provides include: a method to interface new applications to the Burroughs or a means to permit additional terminal access to the Burroughs without adding Burroughs workload; a means to share resources among collocated systems; an alternate means to access Burroughs master file data (i.e., REP FILES); a means to extend the life of the Burroughs while awaiting SPAR; and a vendor independent data communications subsystem for SPAR. Finally, the benefits that intra-site data communications provide are: SNA compatibility and access; ability to share terminals among different systems; and the ability to pass and share data among collocated multiple vendor systems. This last benefit is particularly important

in that access to ICP data for inquiry can be accomplished through this over SPLICENet.

Intra-site interoperability will be important to the stock points during and after full SPAR implementation, regardless of their long term single vendor concept. There will be BBN, PE, Univac, large scale Burroughs, and possibly even Honeywell systems collocated with the new SPAR hardware at some stock points. With SPLICE present, there should be no need to migrate intra-site interoperability: SPLICE will provide for it. However in long term, SPAR itself will need to accommodate this in the SPLICE replacement upgrade.

Intra-site interoperability supports or is supported by the following proposed SPLICE objectives: 6, 8, 12, 19, 21, 23, 26, 29, 32, 33, 41, 44, 47, and 48.

The authors recommend the following actions be taken to improve support in this area:

1. Perform a site survey of planned NISTARS sites to determine if:

    a. NISTARS systems are close enough to SPLICE systems to use FOX;

    b. FOX cables can be physically run from the SPLICE systems to the NISTARS systems;

    c. sufficient ports exist on the NISTARS systems to support FOX controllers.

    Incorporate the results into SPLICENet plans indicating required support by site.

2. If TANDEM-to-TANDEM intra-site connections must use EXPAND/Direct Connect, revise the SPLICENet proposal to elaborate on the Navy interface requirements to use CEM.

3. Confirm the requirements for LCN connectivity.

   a. If NAVDAC does not permit Univac access, delete the Univac LCN requirement from the contract and the SPLICENet proposal.

   b. If FMSO and NAVCOMPTSSA do not require PE access to the LCN, delete the PE LCN requirement from the contract and the SPLICENet proposal.[80]

   c. If ICP and TRIDENT remain disposed to not using HYPERchannel, reevaluate the purpose of the IBM LCN interface. If it is there to support other older stock point IBM systems, validate the system and communications software now being used: a MVS based plan may be inappropriate. Revise or delete the requirement in the contract and the SPLICENet proposal accordingly.

   d. Honeywell DPS6 systems will be installed at some NARDAC sites. Determine if a LCN interface is appropriate and desired for use there.

   e. The IDAFIPS Burroughs 6900 systems may be collocated with other stock point systems (i.e., NARDAC Jacksonville). Determine if a LCN interface is appropriate and desired for use there.

4. Reevaluate the SPLICE contract requirement for use of the ISO OSI standard in LCN software. Permit FDC the option to substitute other LCN software with fewer layers and designed to optimize LAN performance over redundant and unnecessary wide area network error detection and correction integrity features.

5. Have FMSO develop, document, and deploy TABU based bulk file transfer software.[81]

6. Based on operational data received to date, investigate the optimum configuration for HYPERchannel traffic over adapters, particularly on the TANDEM side, as well as trunk line dedication. In a similar

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[80] There is probably insufficient capacity on their NAVSCIPS PE 3210 systems to support both NETEX and PE CIP anyway. This also should be validated.

[81] The authors understand from discussions with NAVSUP personnel that this software may already exist, although documentation was not located on it.

light, optimize Burroughs Pre-Processor/TABU software to improve user terminal response times.

7. Investigate user dissatisfaction over current SNA terminal connectivity requirements. It should be possible for interface software to provide required LU data and menu selection of desired application.[82]

This concludes the discussion on intra-site interoperability. Inter-site interoperability will be addressed next.

D. INTER-SITE INTEROPERABILITY

Although someday, inter-site interoperability may be the exclusive domain of the DDN, that day does not appear to be in the immediate future. Five areas of inter-site interoperability must be addressed by SPLICE: shore based system access, MAPS RJE activity access, DLANet access, DDN access, and DAAS/AUTODIN I access. Following a discussion of how SPLICE will provide interoperability in each of these cases, benefits to the corporation, SPAR migration need, proposed SPLICE objectives supporting and supported by each, and recommendations for improvements will be made.

1. Shore Based System Access

Certain shore based activities such as Ships Intermediate Maintenance Activities (SIMAs), non-TRIDENT Submarine Base Repair Facilities, non-deployed air squadrons, and Naval Shipyards, etc., currently do and will continue to require interface to the Navy Supply System.

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[82] This recommendation is based on discussions with FMSO TRIDENT project office personnel.

Many of these activities will be using SNAP I compatible Honeywell equipment: EDMICS, using Data General equipment, is a notable exception. Some of these activities are within a few miles of supporting Supply Centers making DDN interface inappropriate. This leaves local data communications as the primary access media for interoperability and horizontal/vertical integration.

Neither the SPLICE contract nor the SPLICENet proposal make reference to these interfaces. Although there is insufficient time in this study to investigate and propose individual interfaces for these systems, the requirement to do so does appear to exit, and SPLICE must be the vehicle to meet the requirement.[83]

2. MAPS RJE Activity Access

MAPS is a Navy unique environmental package, usable by both host and satellite personnel, which enables better management of batch processing on Burroughs hosts. MAPS provides for: [Ref. 103]

1. automatic execution of a series or stream of programs which have been pre-cataloged. Both high priority and pre-scheduled normal priority jobs may be executed.
2. automatic file selection and verification for up to nine collocated activity codes (i.e., different users and files) operating on the same Burroughs host.
3. remote input of job stream data files (inputs) from satellite sites through data communications. Remote inputs are specially validated and formatted to prevent erroneously formatted job inputs from ever

[83] See Chapter 8 for several possible methods to interface Honeywell DPS 6 series hardware.

reaching the Burroughs host and to facilitate transfer of job inputs over data communications lines (i.e., compaction of data).

4. host output management including file collection to prevent loss, tape library functions, and managing of paper (i.e., part forms required) and card outputs.

5. remote output management including the compaction of outputs satellite bound to facilitate data transmission, the decompaction of outputs once at the satellite for local printing/punching, bulk file transfers to satellite disk or tape, and special formats and support for immediate print and punch requirements.

6. inquires to the host system for job or output status.

7. restart/recovery support.

8. terminal concentration support to reduce satellite telecommunication line costs.

Phase II of SPLICE will address those portions of MAPS and associated Burroughs software which support satellite operations in terms of both MAPS RJE satellite activity system replacement and data communications access.[84]

In the original SPLICE plans, all existing MAPS RJE sites were designated to receive SPLICE hardware. This remote SPLICE hardware would be interfaced through local data communications lines and off-the-shelf SPLICE software to host SPLICE complexes and then to the Burroughs itself through the LCN. Much of the unique satellite software used today would be unnecessary, as normal SPLICE complex software (e.g., Burroughs Pass-Thru, bulk file transfer,

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[84]A satellite activity can be as close as one mile away from its host site (i.e, SUBASE Pearl Harbor) or several hundred miles (i.e., NTC Great Lakes). This potentially means that DDN may be used for MAPS RJE satellite support.

etc.) could be used to forward uncompacted inputs to and receive uncompacted outputs from the Burroughs via the SPLICE complex. Navy development could thus concentrate on merely supplementing the already existing SPLICE complex software with special satellite software to validate inputs to catalogued job streams and remote site output management.

Two problems have emerged which appear to be modifying this plan. The replacement SPLICE hardware for all MAPS RJE sites was not necessarily budgeted for by NAVSUP. Additionally, some of the Burroughs satellite hardware currently in use is of rather recent vintage and, therefore, does not require immediate replacement. Both of these facts seem to have prompted the following sentence which is taken from the SPLICE SDP III Executive Summary:

> Remote Job Entry (RJE) sites which use the Burroughs Poll/Select protocol will remain on dedicated circuits to the host Stock Points or to the nearest SPLICE site. [Ref. 104]

From this statement, SPLICE Phase II appears now required to address two situations: the interface of existing Burroughs MAPS RJE hardware and software to SPLICE complexes and the outright replacement by SPLICE of existing MAPS RJE hardware and software. The former is not addressed in the SPLICENet proposal, but the latter is.

Current MAPS RJE equipment consists primarily of Burroughs minicomputers and peripherals. Over the years, this hardware has slowly been upgraded and standardized around the B1900 system, although older and smaller systems

still exist. These systems can support Burroughs terminal concentration, high priority document printing, batch printing, card input/output operations, local disk and tape archival storage, and data communications interface to one or more Burroughs FEPs using the Burroughs Poll/Select protocol.

Interfacing such Burroughs B1900 systems to a SPLICE complex may prove to be a challenge. SPLICE should have no problem in accommodating the existing Burroughs Poll/Select protocol, although some modifications in FDC products may have to be made to handle larger record and block sizes, any different characteristics of the B1900 system itself as both a terminal and a concentrator controlling up to 39 other Burroughs terminals, and any unique data verification techniques currently used to provide end-to-end integrity between host and satellite. SPLICENet plans will also require changes to accommodate this foreign host at a SPLICE site (cell) level. The real challenge will be identifying and making B1900 Satellite Activity Monitor II and SAM II Data Communications Handler software changes which may be required to accommodate the fact that they are not interfacing to a Burroughs FEP and SDCH directly. This interface may also require SDCH or other Burroughs host software modifications (i.e., MAPS).

The original SPLICE Phase II plans for outright replacement of current MAPS RJE support, less the B1900

interface, still appear executable. The authors were unable to obtain any firm documentation on FMSO SPLICE Phase II design and development. Questions on this phase still to be answered include:

1. in what form will the satellite destined output formats (i.e., compacted or uncompacted and ASCII or EBCDIC) going to the SPLICE Complex and to the SPLICE satellite be?;

2. how will the satellite operator interface to SDCH if complete remote Burroughs console capabilities are not included in Burroughs Pre-Processor?;

3. how will host output product formats be interfaced to the TANDEM SPOOLER product on the satellite?;

4. and what changes are required to Burroughs host programs to accommodate this new capability?

Without additional data, the authors can say little more about this effort.

3. DLANet Access

A highly visible and critical companion logistics service to NAVSUP is the Defense Logistics Agency (DLA). In that both parties have recognized this, high level agreements have been made to permit organizational components from both activities to access the others' data. For purposes of this document, that means a stock point user at a terminal must be able to access three DLA systems: the Standard Automated Material Management Information System (SAMMIS), the Defense Integrated Data System (DIDS) and the Interrogation Requirements Information System (IRIS), while a DLA terminal user must have access to stock points' MSIR, RDF, RSF, and Excess Status File (ESF) data.

Although a good policy decision, these interfaces in the absence of DDN[85] are somewhat complicated due to hardware, software, protocol, and geographic distance issues. For example, DLA activities use IBM hardware with NCR COMTEN FEPs using the Communications Networking Software (CNS) to interconnect their IBM hosts (DLANet) as a means to provide their users "corporate" access to data and systems. The DLA standard protocol is BISYNC and the standard terminal a 3270 series or compatible. On the other hand, stock points with SPLICE use TANDEM and Burroughs hardware with a TANDEM EXPAND/DDN X.25 network planned to interconnect them. The stock point standard protocol is Poll/Select with Burroughs TD/MT series terminals comprising the bulk of the inventory. Both systems have or will have network nodes CONUS wide, but with few within the immediate vicinity of each other.

After numerous meetings, the technical details to provide this two way interface were ironed out. The FDC SPLICENet proposal outlines the methods and products required to accomplish this [Ref. 105]. The SPLICE sites at NSCs Norfolk and Oakland will serve as stock point gateways into DLANet. At these sites, the SPLICE complexes will install additional software and lines to interface to DGSC

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[85]DLA currently is not a DDN user, nor will it be in the immediate future. NAVSUP though SPLICE is a closed community DDN user, with plans to go interoperable.

Richmond, VA., and Defense Depot Tracy, CA., respectively, for two way system access.

Access to DLANet will be performed as follows. TANDEM's EM3270 product will be required so that TANDEM terminals can emulate IBM 3270 devices. The TANDEM product TR3271 will be installed to permit a TANDEM system to appear to an IBM system as a cluster controller. A dedicated data communications line supporting BSC 3270 will connect the TANDEM system to the appropriate NCR COMTEN for this path. A SPLICE user will access DLANet only from the SAS services screen at either of the gateway SPLICE sites. When validated as authorized, SAS will interact with the local CCP to dynamically configure an EM3270 process (via EMCOM), initiate a session with the COMTEN, and present the user the DLANet signon screen. The user may then access the various DLANet systems/files as permitted by security authorization.

The gateways from DLANet to the SPLICE sites is slightly more complex and requires a second BSC 3270 line. In addition to the TANDEM software already mentioned, two additional products are required: AM3270, to provide support for the in-coming 3270 line from the NCR COMTEN, and TERM INIT/3270, to perform session services and mapping between 3270 data streams and the TANDEM 6530 PATHWAY format. There is also a new software package required for the NCR COMTEN: the Multiple Access Facility with the Remote Host Option (MAF/RHO). This software identifies the TANDEM systems as

remote hosts which are allowed to be accessed by the remainder of the DLANet system.

For a DLA user to access a SPLICE gateway, he must request access to SPLICENet from the MAF/RHO option selection at his site. Previously executed TERM INIT/3270 processes will have opened the AM3270 processes and have been placed in a wait state. When an AM3270 process receives a positive response to its poll of its MAF/RHO subdevices, TERM INIT/3270 assumes control of the session and pushes the SAS logon screen to the DLA user. Once signed on, the DLA user may transverse SPLICENet in accordance with his security access authorizations.

The above described DLANet access is currently in the process of being implemented.

4. DDN Access

Among its roles, the DDN is the mandatory telecommunications interface for ADP systems and data networks [Ref. 106]. As such, SPLICE must interface to it and utilize it in support of many NAVSUP long-haul communications and interoperability initiatives. In addition to stock points, SPLICE was also tasked to fulfill these requirements on behalf of the ICPs and TRIDENT LDS.

The SPLICE plan to interface to DDN consists of at least two phases. A phased approach is required, since it was not possible to obtain any of the full suite of DOD mandated DDN protocols off-the-shelf in the SPLICE

procurement. Also, the phased approached is required since various DDN project waivers permit users different amounts of time before they must become interoperable, while SPLICE must be interoperable to many activities immediately. The two known phases are described below. [Ref 107]

In the first phase, SPLICE will interface to the DDN network as a closed community. Under this phase, SPLICE sites will use TANDEM EXPAND with a CCITT or basic X.25 line and host interface to DDN Interface Message Processors (IMPs). The IMPS will use essentially dedicated basic X.25 transmission lines to reach other SPLICE nodes. Without TCP and IP and while using basic X.25 under EXPAND within the DDN backbone, SPLICE will remain a closed community.

During this phase SPLICE will probably only implement a stock point mail system, permit selected users to logon to other sites via Command Interpreters, and permit the non-DDA sites to pass DDA transmission packages to the DDA gateway site(s).[86] No plans have been located indicating that any "network" applications will be developed during this phase. Gateways to and from DLA, ICP, and DAAS (i.e, via a DDA gateway) will be used employing local or non-DDN transmission lines. Users and processes will be required to logon to the gateway sites over the closed

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[86]In the interim to DAAS using DDN on an interoperable basis, SPLICE will access DAAS/AUTODIN I via a gateway and DDA. See the next section for a discussion of DDA.

community EXPAND/X.25 network, and then use the various gateway applications and processes from there.

In the second phase, long haul interoperable SPLICEnet will begin to be implemented. The original direct EXPAND/basic X.25 interface to the DDN IMP will be supplemented with a FDC provided DDN interface controller, which will still interface to the SPLICE TANDEM system via CCITT X.25, but to the DDN IMP with either CCITT X.25 or DDN Standard X.25. The controller itself, made by Communication Machinery Corporation, will map CCITT basic to DDN Standard X.25, as well as have TELNET, TCP and IP resident on it. Revised FDC SAS and CEM software packages will also be required in this phase [Ref. 108].

Phase II will permit either closed community or interoperable DDN interface on a line. In that two DDN lines are planned at each large SPLICE site, both closed community and interoperable lines can be maintained concurrently: the CCITT X.25 line under EXPAND for SPLICE to SPLICE connectivity and the DOD Standard X.25 line under normal DOD protocols.[87] FTP and SMTP will be implemented on the TANDEM processors. Again, no reference is made to any applications which will use or support the DDN protocols.

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[87]Although not addressed in the SPLICENet proposal, it would be advantageous to have EXPAND work with DDN Standard X.25 as an option rather than CCITT X.25. If this is done, the CCITT (basic) X.25 lines currently in use by NAVSUP can be released with no loss in SPLICE-to-SPLICE site functionality.

It is not clear from the SPLICE project documentation or the SPLICENet proposal if non-SPLICE DDN users who do access a SPLICE site with TELNET will have any SPLICE resident applications available to them. All NAVSUP SPLICE resident applications are being written for TANDEM 6530 block mode devices, not asynchronous, scroll mode devices, as TELNET requires. There is also no indication that any NAVSUP application will be re-written to support such devices, without some funding source. Some TANDEM software packages, like the line editor, will be available for mail interface.

5. DAAS/AUTODIN I Access

DAAS is an acronym for the Defense Automatic Addressing System. AUTODIN I stands for the Automated Digital Network, Number I. Together they represent the primary methods used today to transfer military standard (MILSTRIP) documents among logistics activities (e.g., requisitions, status, etc.).

An activity need merely batch all of its military standard documents together, regardless of destination, append appropriate header and trailer information,[88] and take this package to the nearest AUTODIN access point for transmission. The AUTODIN access point will forward the package to DAAS, which will then make specific document

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[88]The Joint Chiefs of Staff, Automatic Digital Network (AUTODIN) Operating Procedures JANAP 128, of March 1983 apply.

distribution based on standard activity routing identifiers. Alternatively, a site may specifically code the destination routing identifier for each transmission package in order to by-pass DAAS and use AUTODIN I for direct site transmission.

NAVSUP stock points and the ICPs are directly interfaced to AUTODIN I for both DAAS access and direct AUTODIN I site transmissions using a FMSO developed system called On-Line AUTODIN (OLA). This system is PE based and, at stock points, is connected to the Burroughs hosts via data communications lines and interfaces with MAPS software (i.e., TDS/IDST) for package preparation and subsequent document distribution. An Univac 494-to-OLA interface exists at the ICPs.

Four events have made these interfaces no longer desirable.

1. NAVSUP wishes to phase out all of their PE equipment.
2. NAVSUP wishes to phase out Burroughs FEPs, to which OLA interfaces.
3. The ICP Univac hardware is being replaced by IBM hardware.
4. DDN appears now to be the preferred method for computer-to-computer data transmission.

As a result of these events, NAVSUP directed that the OLA system be phased out and replaced by a new Defense Data Access (DDA) system [Ref 109].

DDA itself is planned in three phases [Ref. 110]. Phase I will permit the passing of military standard messages in JANAP 128 header format to only DAAS and receipt

of similarly formatted messages from DAAS. The FMSO documentation appears to anticipate passing Burroughs prepared messages to a FDC software package on the TANDEM for further distribution. The authors anticipate this will be the FDC CEM software and CEM must handle getting them to DAAS. DDA audit capability will be primarily at the message level. Although SPLICE complex and LCN software will get transmission packages to the Burroughs hosts, a MAPS software package, Transaction Distribution System (TDS), will perform document distribution. The JANAP 128 formatting of messages will continue to be done on Burroughs via another MAPS software product, IDST.

If DAAS is on the DDN at the time DDA Phase I software is available and the second phase of the SPLICE DDN interface is also available, the actual message passing will be accomplished via interoperable DDN. If either condition is not met, some number of SPLICE-DAAS gateway sites will be designated and traffic sent to the gateways over the SPLICE DDN closed community subnet. The SPLICE gateway sites must then be interfaced to DAAS itself via landlines to pass on traffic.[89] DAAS will serve as the stock point DDN-AUTODIN I gateway, where this function is still required.

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[89]The SPLICENet proposal recommends use of the TANDEM EXCHANGE software for this purpose, permitting a SPLICE gateway site to appear as an IBM 2780/3780 Data Transmission Terminal using the BSC point-to-point protocol. The FMSO DDA FD mentions nothing about this.

Phase II of DDA will permit transmission of military standard traffic to other than DAAS over the DDN. DDA itself will determine if a message should be sent to DAAS or directly to another on-line SPLICE site. Appropriate routing information and messages will be passed to CEM, who will handle further transmission. Transaction distribution facilities will be moved from the Burroughs to DDA itself. Audit capability will be extended to include batch, message, and transaction levels.

Regardless of whether interoperable DDN access is available on SPLICE, CEM will pass the messages directly to the addressed SPLICE site using the SPLICE EXPAND/X.25 line. The correspondent receiving CEM will then pass the message to the remote DDA receiving module. If DAAS at this point is on DDN directly, the gateways will be eliminated.

The third phase of DDA will include DDA direct access to the two ICPs, as well as full DDN community routing. The CEM at the sending site will determine which path to take: interoperable DDN or CEM-to-CEM over EXPAND/X.25. All ICP destined traffic will be sent over the EXPAND/X.25 line to the applicable ICPNet gateway.

Having addressed the various requirements for inter-site interoperability and how SPLICE can satisfy these requirements, the area of benefits can now be addressed. Shore based interoperability will provide three major benefits:

1. improved supply information to the user community;

2. more rapid transmission of logistics requirements to the supply system;

3. and less manual intervention required to perform logistics missions.

These benefits will have a direct affect on improving fleet support.

Existing MAPS RJE activity access and MAPS RJE site system replacement can provide the following benefits:

1. extension of the life of existing MAPS RJE equipment, thus deferring replacement costs;

2. improved terminal processing capabilities at the satellite sites after SPLICE equipment is installed in terms of both numbers available for use and types supported.

3. improved local processing capabilities in support of local applications and the satellite's ability to use SPLICE complex resident applications, DDA, and DDN after SPLICE implementation.

4. the ability to eliminate card processing at satellite sites via DDA, UCEPS, and other source data automation efforts after SPLICE implementation.

5. the ability to isolate satellite MAPS RJE equipment and operations from additional disruption during SPAR transition by using SPLICE equipment. The additional disruption would be in the form of hardware and software replacement in addition to host procedure and program changes that SPAR transition will require.

These benefits can directly accrue to tide-water fleet support activities enabling them to provide better customer support and to the corporation in terms of better geographic logistics support.

The ability to access DLA systems/files prior to their DDN interconnection provides two benefits to stock point users:

1. the ability to obtain better management information on contract initiatives, DLA stock numbers, replenishment actions, and supply support actions;

2. the ability to more rapidly input update or change actions directly into the DLA system.

Both of these benefits will assist stock point retail commodity/item managers who are responsible for maintaining retail stockage levels in support of fleet customers.

Both DDN and DAAS/AUTODIN I access will provide similar benefits to the corporation, the most important being the ability to electronically transmit and receive information. The DAAS/AUTODIN I access provides this ability in the interim to all DOD activities being on DDN, while also providing document distribution services, if desired. The DDN access provides the long-term means by which the corporation will accomplish horizontal and vertical system integration, establish shipboard to shore logistic system integration, implement a corporate electronic mail system, and permit users and processes to communicate.

The same comments made concerning the need for intra-site connectivity migration to SPAR apply here to inter-site interoperability. Many of the systems mentioned within this section will remain in place for the entire SPLICE life cycle and later be replaced by systems performing similar

functions for which the interface requirements will remain. While SPLICE is present, there should be no need to migrate or be concerned with inter-site interoperability: SPLICE will provide for it. When the time comes to prepare for SPLICE replacement within SPAR, the existing interfaces and lessons learned from SPLICE should be invaluable tools upon which to base replacement system functional specifications.

Intra-site interoperability supports or is supported by the following proposed SPLICE objectives: 6, 8, 10, 12, 15, 16, 19, 20, 21, 22, 23, 25, 29, 32, 33, and 41.

The authors would like to recommend the following for consideration in this area:

1. Initiate a requirements study to determine what are existing and planned local data communications interfaces to stock points, that DDN may/will not accommodate. Incorporate the results into SPLICE project plans and SPLICENet proposal.

2. Revise the FMSO SPLICE Phase II design and the SPLICENet proposal to account for some Burroughs MAPS RJE equipment being interfaced directly to SPLICE.

3. Develop a plan to replace all Burroughs MAPS RJE equipment so interfaced before SPAR implementation. If price remains an obstacle, consider substituting smaller TANDEM systems or components (i.e., EXT or any of several other smaller entry level systems that will be announced by TANDEM this year). This is particularly feasible at small MAPS RJE sites, that do little more today than terminal concentration, transmit input documents, perform local programming and for whom the SPLICE MAPS site benchmark has little practical workload bearing (i.e., SUBASE Pearl Harbor).

4. Eliminate the need for satellite card processing by extending NAVSUP card elimination efforts (i.e., SDA and UCEPS) and DDA to satellite sites on SPLICE. Then, eliminate the card reader/punch from the SPLICE

contract and the requirement for remote card equipment support.

5. Attempt to reduce user input requirements to initiate DLA access to only menu selections and security sign-ons. The system interface concept reviewed by the authors appears feasible but the details must be geared to the GS 4/5 Supply Clerk for use, not an IBM systems programmer.

6. Obtain a commitment from TANDEM via FDC to support standard X.25 under EXPAND. Although the Defense Communications Agency will attempt to block this, retain the basic X.25 lines until then.[90]

7. Ensure that FDC plans for DDN access under SPLICENet will not reduce SPLICE's ability to use existing or planned off-the-shelf TANDEM packages, such as TRANSFER or PS MAIL, the future TANDEM SQL product, or the future TANDEM products which will address interconnecting electronic mail systems.

8. Develop an application access support plan to SPLICE for non-SPLICE systems and users. Include in this plan, what systems, files, and transactions each external user will be authorized by NAVSUP to use and the line/network/gateway/device that each will be using. This plan should then be given to FMSO/FDC/DLA/NAVMASSO to implement, where possible, and require feedback to NAVSUP as to what is required of the user to provide the requested access if not immediately possible.[91]

9. Ensure that FMSO and FDC are both working from the same set of design plans for DDA, particularly in terms of internal site interface. From the limited documentation held by the authors, it is unclear if FMSO is aware of the details of SPLICENet in the area of DDN/DAAS interface. Perhaps the interface to and from DDA to CEM will be as transparent as the FMSO

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[90]Conversations with mid-level Defense Communications Agency personnel indicated that they plan on removing the basic X.25 lines from SPLICE sites as soon as TCP/IP is implemented on SPLICE or until SPLICE's next DDN waiver expires, whichever is sooner.

[91]Of particular interest here is the DDN user on a dumb terminal who "TN's" to a SPLICE site and finds that no logistics services are available to him since they were all designed for more intelligent block mode devices.

documentation assumes. However, from the experience of the authors, such transparent interfaces are few in number, and usually require government changes to implement.

This concludes the discussion of inter-site and shore based interoperability. Shipboard interoperability will next be addressed.

VIII. SHIPBOARD TELECOMMUNICATIONS INTEROPERABILITY

A. CHAPTER OVERVIEW

This chapter will address the area of shipboard to shore establishment interoperability in terms of telecommunications and the Shipboard Nontactical Automated Data Processing (SNAP) programs. Two of the sections presented, Background SNAP I and Background SNAP II, are provided for background information, if the reader is unfamiliar with the SNAP systems that are being installed on all major ships and their application areas. If the reader is familiar with the functions of SNAP I and II, bypassing these background sections is recommended. The Naval Air Logistics Command Management Information System (NALCOMIS) is also discussed in this chapter as it is being deployed on ships for aircraft maintenance and repair at the afloat IMA level. NALCOMIS runs on the same computer hardware as other SNAP I applications, the Honeywell DPS6 series.

The authors intent in this chapter is to show how the "great leap forward" in automating the shipboard environment would benefit from interfacing via telecommunications to SPLICE and from SPLICE to the outside world, rather than the mailed or hand carried magnetic tape, card output, and AUTODIN I system interfaces currently planned for use while ships are in port.

B. BACKGROUND SNAP I

SNAP I is planned for use in selected shore establishments and on large ships. The primary purpose of SNAP I is a replacement system for the obsolete Univac U1500 computer systems currently installed on ships of type CV, CVN, AFS, AS, AD, AR, LPH, and LHA. The Univac U1500 is a batch tape oriented system that is early 1960's technology. This system supported financial, inventory, requisition, and intermediate maintenance management system applications.

The SNAP I computer is based on late 1970's technology, manufactured by Honeywell, and designated as a DPS6 (series). The SNAP I system is to give the above mentioned large combatants and selected shore support activities a real time, disk, and CRT oriented ADP system. The overall concept of the new system is detailed in SNAP II Management Guide [Ref. 111] as:

> To improve fleet readiness and provide a standard automated information system (AIS) to be used by all fleet operational and direct units, afloat and ashore. Inherent to this concept is the premise that all SNAP functional requirements, and particularly the machine interface requirements, are identical for all ship types.

SNAP I will provide ADP support for not only the batch oriented jobs that the U1500s once performed, including the movement of these processes to disk, it will also convert many of these applications to an on-line CRT orientation. In addition, it will automate many of the current manual administrative and logistic shipboard functions, thereby

reducing the paperwork burden on shipboard and staff personnel and allowing them to concentrate more on the quality of the information that is required to be provided to shore establishment commands.

SNAP I is divided into to five functional areas for automation. These ares are: Adminstration (ADM), Intermediate Maintenance Management System (IMMS), Ownship Maintenance Management System (OMMS), Source Data System Afloat (SDSA), and Shipboard Uniform Automated Data Processing (SUADPS). A brief listing of the functions provided in each area follows:

1. ADM - maintains management of Shipboard personnel assignment, career development and retention, health/ administration/morale subsystem management, personnel qualification management, retention program management, ship's bill management, security force management, schools management, visitor control management, and ad hoc query.

2. IMMS - maintains an automated Current Ship's Maintenance Project (CSMP) file at the Intermediate Maintenance Level (IMA) which provides the following functions: plan work requests, screen work requests, create work packages, track job progress, schedule jobs and key events, validate maintenance requests, and ad hoc query.

3. OMMS - will provide the following functions: management of current ship's maintenance project (CSMP), trouble log processing, equipment configuration and logistics support, work package processing, management reports, CSMP reporting process, and subsystem manager functions.

4. SDSA - is designed to provide the following functions: disbursing and personnel area administrative and pay event reporting, pay and fiscal management, SDSA system management information.

5. SUADPS - is to provide the following functions: on-line data entry/error processing, master record file

query, substitute information, interactive material request, picking tickets, Direct Turnover Over (DTO) requisition release, warehouse processing, Consolidated Shipboard Allowance List (COSAL) processing, supply effectiveness reporting, financial management/Budget Optar reporting, and Global reorder/offload.

From this extensive listing it can be seen that SNAP I is designed to automate many of those shipboard administrative and logistic functions that have been performed manually or in a batch mode in the past.

All interfacing to and from this shipboard systems is planned to be accomplished via magnetic tapes, punched cards, or through a paper tape medium to/from the AUTODIN I system. Currently, the SNAP activities which require an automated interface with external systems are as follows: submission of Material Maintenance Management System (3-M) data (OPNAV 4790/2K), receipt of bulk Coordinated Shipboard Maintenance Project (CSMP) input, submission of requisition and budget OPTAR data, receipt of requisition status data, receipt of full and supplemental COSAL update tapes, and automated Allowance Parts Lists (APL) deletion and reestablishment. A more in depth discussion of external interfaces is provided in [Ref. 112].

Even the currently planned off ship interface methods listed above are seen as major improvements in the accuracy and timeliness of configuration and logistics data movement. If a more state-of-the-art interface method was available, SNAP I sponsors would be anxious to pursue it.

C. SNAP I SUPPORT APPLICATION INTERFACES

The currently planned SNAP I to shore establishment interfaces require that when a ship is in port a physical transfer of tape media, punched cards, or paper forms be routinely done in order to transmit or receive any information. An example from the requisition input area will be used to demonstrate this.

The submission of requisitions into the supply system is now accomplished in a number of ways. First, submission may be accomplished by physically routing a tape of MILSTRIP formatted, card image requisitions to the local NSC for processing. Such a tape submission is not only wasteful of physical sailor effort in delivery, it wastes NSC manpower in handling, and must also be converted before the NSC's can read the data, since the data formats are in many cases incompatible. This can result in requisition processing delays of up to three days.

In other cases, punched cards are used as the primary means of delivering requisitions to the NSCs. Besides being equally wasteful of manpower in performing delivery, card processing is obsolete technology and is wasteful of both shipboard and NSC customer service and operations manpower, particularly since this method requires very old card equipment to be maintained and made to function properly.

In the case of high priority requisitions, a manual paper requisition form is often prepared and hand carried to

the NSC, where it must be data transcribed prior to processing. This process in not only wasteful of shipboard personnel time, it requires duplicate data entry efforts, thereby adding to the possibility of error introduction.

Several of the NSC's have developed on-line capabilities to input requisitions via separate telecommunications terminals installed on ships while they are in port. For example, NSC San Diego uses what it calls the Fleet On-Line Inquiry and Requisitioning System. This system consists of a 12" monitor and processor with alpha/numeric keyboard (i.e., a Burroughs compatible CRT) and an 80 column printer connected into their Burroughs host via telecommunications. The telecommunications hookup is a 2-wire single port modem and a registered connecting device. Since this system requires duplicate data entry (i.e., once on the shipboard system and once on the NSC terminal) and human transcription of computer created requisitions, only high priority requisitions are processed in this way. This system also allows users to query local stock availability, obtain requisition status, input requisition modifiers, and perform requisition follow ups.

The system installed at San Diego and similar systems installed at other NSCs do perform the job of allowing fleet units to input high-priority requirements and receive status of the requisitions submitted to the NSC on a real time basis. However, it requires additional telecommunications

workload for the NSC's Burroughs hosts and it has done nothing to improve the submission of large requisition drops (i.e., tapes or cards).

What is required in this area, as well as in all other shore establishment data interface areas, is to have an on-line, high capacity interface capability between the SNAP I computer systems and the logistics system to obtain access to the NSCs and other shore based facilities. In the opinion of the authors, the SPLICE system, particularly with SPLICENet, can not only handle (or expand) the existing number of shipboard single terminal interconnections to the NSCs, but it can also provide other system access (non-NSC), as well as higher capacity links or multiple links to enable the passing of large data packages.

The problem of shipboard interface to SPLICE is two pronged. First, shipboard units have to be provided access to a SPLICE site. Second, mechanisms must be available at the SPLICE sites to allow for shipboard-to-shore establishment interoperability and permanent account space or mailbox storage.

The changes required in the SNAP I system to provide access or establish SPLICE system connectivity were detailed in a meeting held at FMSO on 2 August 1984 and they are as follows:

1. addition of a Synchronous Communications Line Adapter board, to be resident on the Honeywell processor requiring data communication access (requires a SNAP contract modification).

2. addition of the PF/3271 (BSC) software package, to be resident on the Honeywell processor requiring data communications access (also requires a SNAP contract modification).

3. Government programming of "user exits" from the PF/3271 software (provides a presentation layer for the application process to pass data sets).

4. Training of FMSO or NAVMASSO environmental personnel in the above so that they can program the "user exits."

In addition to these enhancements to the SNAP I system, the SPLICE system will require "peer" presentation and application processes to interface with the SNAP I computers, as well as 6100 communications subsystem ports available, capable of dealing with BISYNC lines. This higher speed land line interface also requires the use of quality, dedicated phone lines, with synchronous modems at either end, for each SNAP system on the pier.

If this BISYNC dedicated line service cannot be made available for pier-side use, then the SNAP I sites could alternatively implement a dial-up modem option to interface to SPLICE. SNAP I Honeywell systems can be directly connected to a Rixon modem (i.e., R212A) to accomplish this (available from the SNAP I contract) with user written asynchronous interface software to permit the Honeywell system console or a designated terminal to act as a remote asynchronous terminal to the SPLICE host. No off-the-shelf software package was located by the authors which could perform this function.

A second alternative would be the use of one of the SNAP I system's smart terminals/PCs (i.e., Z-150's) to download data to be transmitted to the PC's disk from the Honeywell system, using a Honeywell provided software package (i.e., Microsystem VIP Emulation). When all data is on the PC, the user would shift to a stand-alone PC operating mode; dial-up the local SPLICE site using a local phone line/asynchronous communications package and sign-on to SPLICE via SAS to process transactions or pass data as required.

Assuming that SPLICE system connectivity has been provided at some SPLICE site via one of the methods proposed above, the second problem, providing shipboard-to-shore establishment interoperability can now be addressed. There are three aspects to this problem: local processing, AUTODIN interface, and DDN interface.

Once the shipboard user has passed security and signed onto a SPLICE site, what can be processed locally via a SNAP I terminal or process will depend on the processing functions performed at the SPLICE site. In the case of a NSC, a full range of logistics functions as well as other system interfaces may be locally available. In the case of a user signing on to a NARDAC or NARDAF SPLICE site not running UADPS-SP, the user might have to use SPLICENet to access a SPLICE site processing UADPS-SP to obtain full logistics functionality. Assuming that the user has

signed-on to a logistics capable site, at least the following processing may be accomplished:

1. input of high priority requisitions.

2. input of bulk requisition packages generated directly from the SUADPS-RT system onboard the ships. This would eliminate the delay and wasted man hours of having to convert magnetic tapes to a format capable of being read by the NSC's system, reduce the need for obsolete card equipment on both systems, and would also eliminate the need to enter a requisition more than once.

3. requisition status, stock status, stock management data inquiries using either SPLICE Burroughs pass through or the SPLICE resident applications including replicated files. This would reduce the number of phone calls that are received at the NSCs for status of parts ordered, requests for stock management data, and requests for current stock assets on-hand.

4. receive status back for inputs submitted for direct input to SNAP I processes.

5. use of either SPLICE TANDEM TRANSFER/PS MAIL and TANDEM editors or DDN mail and editors.

6. upload or download of files to and from the SPLICE system. These files could be local status outputs from NSC batch processes, a series of user queries captured to disk, MTIS inquiries, or similar actions.

The second part of shipboard-to-shore establishment interoperability concerns AUTODIN I processing. Today shipboard units receive the majority of their requisition status via AUTODIN I cards or tapes which must be input to SNAP I processes on a batch basis. The following describes how the status updates of requisitions could be forwarded to the ships in a more timely manner and the amount of Naval message traffic generated for status of high priority requisitions could be reduced using SPLICE:

1. A system that is in development now will permit both SNAP I and SNAP II systems to receive their logistics MILSTRIP messages from the AUTODIN system in an on-line manner instead of the current hard copy formats, if certain changes are made. As previously discussed, DDA is a NAVSUP planned, major replacement of the existing PE based On-Line AUTODIN (OLA) system being used at stock points. When DDA is implemented, all stock points and ICPs, as well as any other SPLICE site which have implemented DDA, could have the capability to interface with other sites for passing and receiving logistics traffic directly or using the DAAS system as a switch between AUTODIN I and DDN.

2. SPLICE is to be implemented at all the NARDACs and NARDAFs. If NAVDAC would agree and be funded to have the NARDACs and NARDAFs to become the DDN hosts for shipboard users via their SPLICE systems, the following could occur: DDA could be implemented at each NARDAC and NARDAF; DAAS would record each ships address as being at an appropriately located NARDAC or NARDAF and forward all AUTODIN traffic for the units there; DDA would process DAAS inputs for the ships and segregate transmissions into separate shipboard accounts or mailboxes at the NARDACs or NARDAFs. Using the download procedures described previously under local processing, these files could be received shipboard and input into SNAP I. Ships could also reverse the process and send their traffic out over DDA to DAAS and then through AUTODIN I.

As previously indicated, the authors envision a system that would allow the users to be either directly connected or dial-up connected to their host NARDAC or NARDAF SPLICE system and be able to access their pre-established account or mail box to pull down existing traffic or input new traffic. In this way, the process of receiving AUTODIN traffic via mail or tape in card format or Naval message format could be eliminated during the time a ship is in port or in a local operations status.

The final area of shipboard-to-shore establishment interoperability is DDN access and usage itself. There are

three aspects to this. First, the shipboard units must have a shore-based DDN host site available to serve as their data repository when they are not in port. The authors have recommended the use of SPLICE NARDACs and NARDAFs sites for this role. Second, once the ship has signed on to a SPLICE node, it must be able to have available to it the full range of DDN protocols for interoperability outside of the logistics community. SPLICE plans to provide this under SPLICENet. Third, the shipboard user should also have access to portions of the SPLICENet which will provide interface among NAVSUP customers through SPLICE TANDEM EXPAND/X.25 facilities, and which also provides interface to ICPNet and DLANet.

If the above multi-pronged proposal were adopted, a method would exist for inputting any shipboard data to any shorebase location via SPLICENet (i.e., providing access to DDN, DDA, ICPNet, and DLANet) or vice versa. With this in place, other shipboard systems could also take full advantage of it. For example, shipboard financial documents and returns must be submitted to and interfaced to IDAFMS. This proposed NARDAC and NARDAF DDA interface or the fully DOD interoperable SPLICE DDN interface using FTP could be used to meet this shipboard interface requirement to IDAFMS.

The SDSA project, in support of the SDSA subsystem that is to be run on the SNAP I computer, is the functional sponsor that has most aggressively pursued the ability of a

ship in port to be able to transfer its pay and personnel data to the shore based SDSA subsystem, in a real-time mode. Data submission is currently done by magnetic tape. The delays caused by the mailing of the tapes becomes very wasteful in the amount of transactions that must be overridden on LES's by the local disbursing officers. The average delay from a mailing is 13 days and 27% of the changes submitted must be overridden by the local disbursing officers [Ref. 113].

The direction that the SDSA program manager is moving toward is that of using a phone link to some unspecified DDN connection while the ship is in port to reach the two end activities, the Naval Finance Center Cleveland and the Naval Personnel Command, Washington. This proposal provides that "unspecified" connection.

Since a connection to the DDN can be made with the SPLICE computer, the proposed interface would reduce the need of the extra line to service solely the SDSA input from the SNAP I computer. Since the ship can support only so many phone lines, it makes sense to combine all the electronic output into one line and machine. The connection should be from the SNAP I computer to a local SPLICE system. SPLICE in this case would be used as a connection to the DDN for transfer of the information from the ship to the receiving activities DDN files, account, or mail box. If on-line SDSA shipboard terminal access is also desired, the

DDN TELNET protocol will be available from SPLICE to permit shipboard users the ability to "TN" to the SDSA shored based host(s) and sign on.

The ships could also use the SPLICE connection and SPLICENet to logon to ICPNet and download COSAL changes and/or update the ship's configuration information on SPCC's Weapons System File (WSF). The processing of COSAL changes and the submitting of ships configuration changes had been a manual process until the installation of the SNAP I computers. This process is now served by an automated data base onboard ship that is updated periodically by magnetic tape input. The inputs to this process come from the WSF maintained by SPCC.

Since SPCC is a user of SPLICENet, it seems only sensible that instead of waiting for a quarterly tape dump of COSAL changes to be mailed to the ship, an on-line facility using SPLICE as the backbone could be utilized to forward these changes. In this way a ship upon arrival in port could connect to the local SPLICE site through the proposed shipboard SPLICE interface and then on to the DDN to connect to the SPLICE computer at SPCC from which ICPNet access is available. The ship could then download its COSAL changes to the remote SPLICE site, FTP applicable changes to its local SPLICE DDN host, and finally download the changes to its SNAP system or intelligent terminal. In this manner the shipboard user could receive his COSAL changes that

would be held in read-only files at SPCC, waiting for him to retrieve them. This seems to the authors to be a more expedient and efficient method for disseminating the critical logistical support information that is contained in the quarterly changes tapes.

All of the above systems are looking at either having their own shipboard interface or terminals to transmit information to and from ships. By using a single SPLICE interconnection, the need for multiple lines to the ship and the confusion and trouble of dealing with them would be reduced or eliminated.

The feasibility of using such an approach for shipboard connectivity has already been demonstrated. Currently, a Submarine tender located in Europe is using MINET, with a link to the DDN and a Bulk Media Terminal, to transfer machine readable information across the packet networks [Ref. 114]. In this case the tender is sending requisitions to a stateside DDN host, with the Poseidon Material Office, Atlantic (PMOLANT) as the intended recipient. PMOLANT then accesses the DDN host via a dial-up to a TAC from Charleston, S.C. and receives the requisitions or sends status by use of the mail facility on the DDN. Justification for this method lies in the reduction of system handling time and of transmission delays which would occur using the AUTODIN system or the extensive manual effort required for message transmission alone. With this

system, requisitions can be sent and received in as little as 6 hours from start to finish [Ref. 114]. The proposed SPLICE implementation could provide similar services and benefits to all SNAP I users.

The final area that will be addressed is how SNAP I tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously presented corporate and project goals and strategies. SNAP I directly supports and/or is supported by the following SPLICE project objectives: 12, 15, 16, 19, 21, 22, 33, and 35.

There are several recommendations the authors have for possible enhancements to SPLICE/SNAP I that will enable them to provide greater support or benefit to the corporation and to the Navy as a whole:

1. Investigate and test the software/hardware to support the SNAP I telecommunications interface to the SPLICE system to allow for both on-line interaction and bulk file transfer to the logistics system using the synchronous interface.

2. Investigate and test the software to support the SNAP I user interfaces to the SPLICE system via the Honeywell host itself or a smart terminal/PC installed on SNAP I ships and a modem using an asynchronous line. Either of these interfaces would provide for both shipboard on-line inquiry and bulk file transfer capabilities using SPLICE or other supported terminal emulation software such as the MicroGate 6530.

3. Investigate the possibility for SPLICE providing the gateway to DDN for shipboard users using NARDACs and NARDAFs as hosts. This would provide shipboard access and system interoperability necessary for systems such SDSA, IDAFMS, and COSAL updates.

4. Investigate the possibility of SPLICE being the shipboard access to AUTODIN I via a DDA interface at the NARDACs and NARDAFs. This includes the establishment of SNAP I ship DDN accounts or electronic mail boxes there. This would allow all SPLICE users and DDN users the ability to send information electronically to the ships. Data such as COSAL updates, Disbursing, Financial, and Personnel data could then be passed in this manner on-line.

5. See the proposals in Chapter IV for shipboard interfaces to SPLICE for use of REP FILES and MTIS processing and the Chapter VI proposal for IDAFIPS OPFORCES interface.

This completes the discussion of SNAP I/SPLICE interface. SNAP II interface will next be addressed.

D. BACKGROUND SNAP II

SNAP II is the small ship equivalent of SNAP I. It is based on a Harris computer system that is configured to use the same type data files as the SNAP I computer to promote interchangeability of data. The goal of SNAP II is very similar to that of SNAP I's: to provide the maximum automated interface possible with other fleet and shore based automated information systems (either on-line or off-line) or activities and to require minimal supply, maintenance, and training support. The SNAP II Shipboard Management Overview Guide calls for the system to: [Ref. 111]

> Provide each ship with a fully automated logistics management system that interfaces with the Weapons System File (WSF) and all other shore data bases.

SNAP II, like SNAP I, replaces most of the manual systems onboard the ships by combining the information that

they use into a common data base. This data base is used to produce internal reports and data, as well as reports for off ship use. SNAP II has five major subsystems: System Management Subsystem (SMS), Maintenance Data Subsystem (MDS), Supply and Financial Management (SFM), Administrative Data Management (ADM), and Mobile Logistics Support Force (MLS). A general description of each follows:

1. SMS is concerned with the management of the computer and the data base and has little need for outside interface other than controlling the output devices for other functions.

2. MDS provides the on-line interactive 3-M system which needs to communicate with the IMMS and CSMP system on SNAP I computers. The interface to this system for input and output off the ship is magnetic tape.

3. SFM is an interactive system which supports supply control, requisition processing, inventory management, COSAL maintenance, and financial management functions. This function needs to interface with outside sources both SNAP I and IDA. The present plans call for magnetic tape interfaces.

4. ADM is to support the ship-internal Manpower management as well as SDSA which has numerous off ship interfaces to be maintained.

5. MLSF is an automated data processing system that supports replenishment functions on SAC 224 accounting ships.

At times, a function may utilize more than one subsystem when entering or extracting data.

E. SNAP II SUPPORT APPLICATION INTERFACES

SNAP II, as implemented, has dramatically reduced the amount of manual effort required to provide the information and documentation that is needed to perform the support

administration and logistic functions necessary onboard small ships. In that the inputs and outputs of the two systems are similar, SNAP II could benefit, in much the same ways as SNAP I was shown to have benefitted, from a telecommunications interface with shore based sites. In light of this, no repetition of the required interface initiatives and programs will be repeated here.

The major problem in interfacing SNAP II units with SPLICE is that SNAP II hardware will only support an asynchronous, intelligent terminal/PC oriented off-ship interface, instead of the above interface and the synchronous interface described in the SNAP I section. The connection to a SPLICE host would have to be via dial-up phone line from their Zenith-150 (IBM Compatible) PC terminals, when not operating directly off the SNAP II computers, through a terminal emulation package compatible with SPLICE. This could be accomplished by using a software/hardware product such as MicroGate 6530, a TANDEM 6530 terminal emulation package, that enables PCs full access to all the features available of a TANDEM, plus the ability to up or download files. A good discussion of some alternative ways to implement SPLICE interconnection is provided in [Ref. 115].

The final area that will be addressed is how SNAP II tactically supports or can be made to better support the proposed SPLICE objectives, thereby supporting previously

presented corporate and project goals and strategies. SNAP II directly supports and/or is supported by the following SPLICE project objectives: 12, 15, 16, 19, 21, 22, 33, and 35.

There are several recommendations the authors have for possible enhancements to SPLICE/SNAP II that will enable them to provide greater support or benefit to the corporation and to the Navy as a whole:

1. Investigate and test the software to support the SNAP II user interfaces to the SPLICE system via the smart terminal/PCs installed on the ships and a modem using an asynchronous interface. This interface would provide for both shipboard on-line inquiry and bulk file transfer capabilities using software such as the MicroGate 6530.

2. Investigate the possibility for using SPLICE to provide the gateway to DDN for shipboard users using NARDACs as hosts. This would provide shipboard access and system interoperability necessary for systems such SDSA and IDAFMS.

3. Investigate the possibility of using SPLICE for shipboard access to AUTODIN I via a DDA interface at the NARDACs, including the SNAP II ship DDN accounts/ electronic mail boxes being located there. This would allow all SPLICE users and DDN users the ability to send information electronically to the ships. Data such as COSAL updates, Disbursing, Financial, and Personnel documents, returns, and reports could then be passed to the shore community in this manner on-line.

This concludes the discussion of SNAP II. The NALCOMIS-SPLICE interface will next be addressed.

F. NRMM APPLICATION INTERFACES

The Naval Aviation Logistics Command Management Information System (NALCOMIS) interface to the logistics

community is through the NALCOMIS Repairables Management Module (NRMM). NRMM interfaces with both SNAP I SUADPS and shore based air stations via UADPS-SP or UADPS-LEVEL II.[92] NRMM runs on the SNAP I computers as a real-time, management information system. It was designed to increase and provide better support of the aviation logistics and maintenance efforts of squadrons while they are shore based or embarked on ships.

NRMM will take both terminal inputs and magnetic tape inputs. Its data is stored on magnetic disks that can be accessed by users from remote terminals located on the ships. Outputs consist of terminal displays, printed reports, magnetic tapes, disk, punch cards, and paper punch tape.

NRMM is designed to allow its users to achieve rapid retrieval of information from its data base or input to it. In doing so, it allows users to monitor all facets of an IMA's logistic data: status of outstanding requisitions, local rotatable pool assets, support equipment, and cross-reference of part numbers and stock numbers for degree of family interchangeability. The system also provides technical publication records, tracking of cannibalized assets for each airframe, as well as performing other administrative tasks.

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[92] In this document the authors will address only the UADPS-SP interface; insufficient information concerning the UADPS-Level II interface was available to address it.

NRMM interfaces ashore to UADPS-SP, and afloat to SUADPS, by using punched cards and magnetic tapes as both input and output. The NRMM outputs are mainly requisitions and follow-ups for material. Its external logistics inputs are to NRMM are requisition status images and management data information via Master Stock Item Records (MSIR) updates. Selected MSIR data from UADPS-SP is actually overlayed on the NRMM data base. This is called Aviation Coordinated Allowance List (AVCAL) update. During this process, the NRMM records are updated to reflect MSIR material management information such as on-hand quantities, MCC, LMC, COG, SMIC, SM&R, and purpose codes. NRMM also uses the results of UADPS processing of the FMSO change notice action tapes to update the NRMM NSN records. [Ref 116]

Since NRMM will be running shipboard on SNAP I hardware it seems that instead of using magnetic tapes or punched cards as input and output to the Air Stations or Stock Points that the same SNAP I telecommunications interfaces recommended earlier could also benefit NRMM. Since many Air Stations are also SPLICE sites, the updates from the replicated MSIR or UADPS-SP status of requisitions could be sent via SPLICE telecommunications to the NRMM/SNAP I hardware site, via the file upload/download capabilites described in the SNAP I section above, vice hand carried in card/tape format.

In that NRMM runs on the SNAP I hardware, the same SPLICE objectives that apply for SNAP I also apply for NRMM. The recommendations that were made for SNAP I, hold equally well. Further since NRMM is used on SNAP I hardware located at the Naval Air Stations while the squadrons are not deployed, the argument for development of a bisynchronous link for intercommunications to the SPLICE system at the Air Stations or the nearest SPLICE site makes even more sense then the planned use of magnetic tape or cards for information transfer.

This concludes the discussion of NRMM, the final area of discussion in this chapter on shipboard telecommunications interoperability.

XI. SUMMARY AND CONCLUSIONS

A. SUMMARY

Until very recently, the SPLICE project has had a limited effect on the NAVSUP and logistics operational communities. As has been seen in this document, since the signing of the SPLICE contract in fiscal year (FY) 1984 the seeds to dramatically increase that effect in both range and depth have been laid.

The SPLICE project began dynamically in the late 1970's, with plans for rapid development and deployment of both environmental and application software, based upon PE systems. Its purpose: to resolve Burroughs capacity, telecommunications, and architectural deficiencies, while standardizing stock point minicomputers and adding interactive processing capabilities. When limitations in this plan forced NAVSUP to competitively solicit SPLICE hardware and system software, the project all but disappeared from notice for several years. The capacity problems had to be addressed with additional Burroughs and PE hardware, while SPLICE targeted applications migrated to ADP systems where immediate capacity was forthcoming.

During this time, however, SPLICE planning was not dormant. As requirements and needs changed within the stock point system, SPLICE changed with them. Although this

caused great fluctuations in detailed environmental designs, SPLICE plans were consistently based upon perceived and anticipated future needs of the stock points. The SPLICE networking and interoperability plans support this view.

Once the SPLICE contract was within NAVSUP's immediate grasp in FY 1984, the project again came forward into the lime light, with large amounts of capacity and Burroughs saturation relief potentially available, but without applications to take advantage of it. At this point, applications were found and implemented for immediate capacity payback (i.e., TLOD, FILE REPS for Inquiry, TRANSRECON Offload, and Burroughs Pre-processor). In many cases, the full potential for these applications was downplayed in order "to get something out there." Only now are limited efforts underway to exploit SPLICE processing capabilities.

SPLICE planning has mostly been geared toward required project Life Cycle Management approvals. When NAVSUP changed direction and undertook a corporate planning view, SPLICE plans were found outdated, still geared toward immediate stock point environmental needs, and looking toward isolated stock point implementations (i.e., APADE, SPLICE ABE, STATLOC, NAVADS, FMSO IDA, and UCEPS). There has been insufficient time for the project to analyze how it and these efforts could be integrated to provide maximum

benefit to the corporation at large, with the notable exception of SPLICENet.

This work has taken the "corporate view" in assessing the SPLICE project's goals, strategies, and objectives in order to propose a revised set of each for consideration and possible adoption (i.e., Chapter III). These revised planning tools were then applied to:

1. existing and potential SPLICE applications, both centrally designed (i.e., Chapter IV) and local designed (i.e., Chapter V);

2. and existing and potential interfaces, both shorebased (i.e., Chapters V and VII) and shipboard (i.e., Chapter VIII).

As a result of the review of these tactical plans, numerous recommendations have been made throughout Chapters III through VIII on potential ways to increase corporate support and to achieve corporate objectives through changes in specific SPLICE or application initiatives.

B. CONCLUSIONS

The SPLICE project can have a critical role to play within NAVSUP and the stock point community. The magnitude of this role will be determined by the degree that the project can integrate itself into the framework of NAVSUP corporate plans and objectives, while assuming a leadership role in defining the interim stock point information architecture.

Between SPLICE and the Burroughs B4900 CPU replacement initiatives, significant capacity has been brought to the

doorway of the stock points; sufficient capacity, in the authors' opinion, to sustain the stock points through the decade. The B4900 capacity can be implemented immediately; the SPLICE capacity only through new download applications, the integration of existing TANDEM based efforts, and implementation of new additional applications, as described in this document. It appears that the SPLICE capacity will be largely unused, however, due to current plans to forgo new SPLICE efforts in favor of the transition of current Burroughs processing applications on the soon to be procured SPAR hardware.

If the SPLICE project, together with the NAVSUP and FMSO stock point functional codes, were to boldly take the initiative to implement applications on the already known and available SPLICE systems, the need to undertake SPAR transition would not exist. Rather than go through the labors of transitioning UADPS-SP in its current form and implementing it at a few NAVSUP sites during the remainder of this decade, the authors have concluded that B4900 and SPLICE UADPS-SP application "modernization" initiatives should be undertaken. Permitting SPLICE and the B4900s to shoulder the burden of capacity through this decade would relieve SPAR from rushing into an unknown, costly, and potentially risky transition of applications to new hardware and software that would do little more than they do today. If only a portion of the SPAR transition effort were

expended on SPLICE initiatives, real processing improvements would be provided to the stock points in the short term. This would also permit SPAR to concentrate on UADPS-SP modernization: the long term need of and goal for the stock points.

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APPENDIX A

NAVSUP STRATEGIC INFORMATION SYSTEM PLAN OPPORTUNITIES

I INVENTORY MANAGEMENT

* 1. Improve visibility of Navy-owned assets to promote greater logistics support effectiveness.

2. Enhance weapons system management capabilities.

3. Improve performance measures for determining weapons systems support effectiveness.

4. Improve fleet support by use of item essentiality codes and more accurate shortage cost estimates for wholesale replenishment.

5. Improve retail aviation support through use of a new AVCAL model (RIMAIR).

6. Improve capability to make procure versus repair decisions for intermediate and depot level repairables.

7. Improve supply effectiveness with capability to detect and eliminate supply pipeline constrictions in a real time environment.

8. Improve the capability to determine multi-echelon stocking decisions at wholesale, intermediate and consumer levels, and by weapons system.

9. Satisfy a SMPG requirement by providing a capability to distinguish sources of demand, i.e., customer in terms of UIC, service, country, etc.

* 10. Improve capability to provide ICP and stock point managers with sensitivity and trade off analysis ("what if" models) results for material/funds/effectiveness questions.

11. Improve operational readiness for new systems by implementing the wholesale provisioning model.

12. Improve effectiveness of SPCC load lists by adopting and implementing the availability model.

* 13. Satisfy OSD requirements (RIMSTOP) to implement a three-echelon supply system.

14. Improve techniques for measuring supply system performance and customer satisfaction.

II DATA MANAGEMENT

* 15. Improve inventory accuracy, data quality and control through improved application design and operational procedures at ICPs and Stock Points.

* 16. Improve the quality and accessibility of data by establishing a program to manage data as a corporate resource.

17. Improve systems effectiveness through the participation in Navy wide functional data architectural reviews to standardize systems, promote data sharing and streamline information flow.

* 18. Reduce data redundancy and promote data sharing, accessibility and accuracy through the incorporation of common data elements in an integrated data base environment that serves ICPs, SPs, HSCs, and other shore and afloat customers.

* 19. Facilitate interservice sharing and exchange of data to improve common logistical support.

* 20. Provide adequate policy for protection of ADP resources through an effective ADP Security Program.

21. Promote integrity and efficiency by providing internal controls in application programs and environmental software.

III SYSTEM INTEGRATION

* 22. Improve the use of hardware and software systems through the definition of the integration requirements for on-going and planned initiatives such as office automation, telecommunications, SPLICE, Stock Point Replacement and ICP Resolicitation.

* 23. Promote competition in future information system resource acquisitions by developing portable and machine independent application programs.

* 24. Improve local telecommunications capabilities at NAVSUP activities and Navy stock points by installing local area networks.

* 25. Determine the requirements for automated exchange of information between and among field activities and headquarters via a command wide communications network.

* 26. Improve the use of micro-computers and their off-the-shelf software, in the management and exchange of information, within and among NAVSUP components.

IV SYSTEM MODERNIZATION

* 27. Improve reliability, timeliness and quality of data by reducing the use of PCAM equipment and hard copy outputs in financial, procurement and supply systems through the use of computer output microform and video display terminals.

* 28. Improve user capabilites and data processing efficiency and reliability through the replacement of obsolete, worn out ADPE.

* 29. Improve mobilization and workload expansion capabilities at ICPs and SPs.

* 30. Eliminate Navy-unique systems software through the use of vendor off-the-shelf environmental software.

* 31. Reduce paperwork and improve productivity and administrative management by developing office automation systems to provide tools such as electronic mail, text editing, electronic files, electronic calendars, and graphics within NAVSUP HQ and its field activities.

* 32. Improve productivity through automation of manual processes.

33. Improve management and control of conventional ammunition inventories through the redesign of CAIMS.

34. Improve information systems support services at the stock point and ICP data processing installations by upgrading and expanding hardware configurations and facilities, including uninterruptable power, air conditioning and fire protection.

35. Reduce the complexity and length of the logistics information systems acquisition process.

36. To increase user effectiveness and productivity and improve the use of Navy assets by providing better systems and streamlined business methods.

* 37. Provide for a less complex, more flexible and reliable hardware/software environment through contractual vehicles which facilitate technological refreshment and a long-term single vendor relationship.

* 38. Improve long haul communication user access to ICP and stock point data through the use of the Defense Data Network.

* 39. Improve management decision capability by enabling managers to easily access and manipulate data through use of automated tools.

* 40. Improve logistics management by providing easy access to configuration and weapons support data.

V QUALITY PERSONNEL

41. Improve productivity and effectiveness by elevating the information technology skill level of information systems development and user personnel through formal training programs.

42. Improve personnel posture through the development and implementation of a personnel planning program which would include training, mobility, work environment, retention, staffing, grade structure, recruitment, etc.

43. Establish a cadre of functional personnel to improve user effectiveness through increased emphasis on functional work requirements and deficiency statements.

VI RESOURCE MANAGEMENT

44. Improve the execution of 04 business functions through aggressive implementation of NAVSUPNOTE 5400 of 20 Nov 84 (04 Reorganization).

* 45. Improve management and control of local unique application programs as by-products of the ICP Resolicitation/UADPS-SP Replacement.

46. Improve SUP 04 consolidated budget information.

* 47. Improve the way basic business functions are performed at stock points.

48. Improve the way basic business functions are performed at ICPs.

49. Focus resources and improve effectiveness of FMSO products and performance.

50. Improve effectiveness, quality, timeliness and auditability of responses to external reviews, audits and inquiries from activities such as Congress, GAO, GSA and DOD and Navy organizations.

51. Obtain timely GAO certification of financial accounting systems.

52. Improve the use of hardware and software resources by establishing configuration management and capacity management programs.

* 53. Insure continuous information systems services through improved contingency capabilities.

54. Improve the ability to acquire necessary resources in the budget process as a result of better documented requirements through the IRM program.

55. Strengthen NAVSUP's IRM resource acquisition and budget process through the application of SECNAV LCM procedures.

56. Establish a Problem/Opportunity Hopper to provide early visibility and control of potential problems and targets of opportunity.

57. Establish a formalized "Lessons Learned" process to minimize repetition of past mistakes.

58. Increase the use of statistical techniques to measure and improve operations.

59. Institutionalize the strategic and tactical planning process.

60. Fulfill the CNO (OP 945) IRM planning requirements through the SUP 04 strategic and tactical planning process.

61. More effectively respond to Command Goals and Objectives through the SUP 04 strategic and tactical planning process.

VII TECHNOLOGY EXPLOITATION

* 62. Provide improved information systems technology throughout NAVSUP.

* 63. Exploit the use of information systems technology in the solution of logistics management problems.

APPENDIX B

NAVSUP STRATEGIC INFORMATION SYSTEMS PLAN ASSUMPTIONS

I. INVENTORY MANAGEMENT

* 1. The ICPs and SPs will continue to provide weapons systems logistics support for the Navy.

* 2. UADPS-SP, UICP, and Level II will continue as NAVSUP's standard baseline supply and financial management systems.

* 3. NAVSUP will continue to be a sponsor for uniform standard supply and financial information systems for use by Navy stock points external to the NAVSUP Command.

4. Integration of wholesale material management across DOD will increase and Navy ICPs will serve a broad range of DOD and foreign government customers.

5. The number of wholesale line items managed by Navy ICPs will decrease slightly, but emphasis on repairables will make item management more complex.

6. SMPG and other DOD initiatives will require development, analysis, and review of MRD models and procedures at an increased level of effort and complexity.

* 7. The Command emphasis on economic analysis and operations analysis will continue at the current levels.

* 8. The measurement of readiness and its cost by weapons system will receive increased emphasis.

* 9. There will be increased pressure to use multi-echelon inventory models.

* 10. There will be increased pressure to achieve complete visibility of all inventory assets.

II. DATA MANAGEMENT

* 11. NAVSUP will recognize information as a corporate resource and implement in Information Resources Management (IRM) Program.

* 12. The requirement to share common data among DOD components, other government agencies and contractors will grow in emphasis and number of applications.

* 13. Emphasis on ADP Security will increase.

* 14. Off-the-shelf DBMSs and automated data dictionaries will be used in all major systems.

III. SYSTEM INTEGRATION

* 15. The hardware and software technology of SPLICE, ICP Resolicitation, Stock Point ADP Replacement and office automation will be integrated.

* 16. The Defense Data Network will be the basic long haul communications network of the Navy.

* 17. NAVSUP 04 will place increased emphasis on the integration of afloat and ashore management information systems.

IV. SYSTEM MODERNIZATION

* 18. Use of office automation and PCs will expand significantly within NAVSUP headquarters and the field activities.

* 19. The use of off-the-shelf vendor environmental software will minimize the need for Navy-unique environmental software.

* 20. The single vendor concept will continue as the preferred procurement strategy for total information systems support.

* 21. High level programming languages will increase in use for ad hoc reports, queries, and application programs.

V. QUALITY PERSONNEL

* 22. Additional training will be required to meet the needs of the new technology.

* 23. Information centers will assist and train end users in the new information systems tools and techniques.

* 24. New technology will continue to generate a requirement for specialized information systems skills.

* 25. It will be increasingly difficult to recruit and retain employees because of more attractive salaries and benefits within the private sector.

VI. RESOURCE MANAGEMENT

* 26. The internal organization will be modified as required to meet changing requirements.

* 27. The SUP 04 Strategic and Tactical Information Systems Plans will be the blue prints for guiding, shaping, and directing SUP 04's near and long term efforts.

* 28. NAVSUP will continue to staff, manage, and operate its own information processing facilities.

* 29. A network control center for management and administration of NAVSUP's telecommunications network will be established.

* 30. NAVCOMPTSSA will be the CDA for payroll, leave, and IDA-SP applications.

* 31. Laws and policies such as the Paperwork Reduction Act, the Brooks Act, Warner Amendment, the Commercial Activities Program, and FARs will continue to influence and complicate information systems management.

* 32. Emphasis on fraud, waste, and abuse and the Federal Managers Financial Integrity Act of 1982 will continue and oversight will intensify.

* 33. Telecommunications tariff rates will increase at about 20 percent per year over the next 3 years.

* 34. Efforts will be made to replace current workload measurement techniques with engineered standards and statistical methods.

* 35. There will be continuing pressure to resource information systems operations outside the NAVSUP claimancy.

* 36. Business workload at SPs and ICPs will continue to increase.

* 37. Use of contractors to provide technical support will increase.

* 38. Decision support systems will be increasingly automated.

* 39. Productivity increases will be used to meet resource shortfalls.

* 40. There will be increased emphasis on policies and standards to effectively exploit technology and implement IRM requirements.

* 41. There will be an increased demand for establishing and maintaining controls to more effectively manage SUP 04 functions.

VII. TECHNOLOGY EXPLOITATION

* 42. The capabilities of office automation systems and PCs will continue to increase with corresponding improvements in the price/performance ratio.

* 43. Use of off-the-shelf application packages will be the standard practice for PCs and Office Automation Systems.

* 44. Computer price/performance ratio will continue to improve.

* 45. New application development productivity tools will reduce the time required to develop information systems.

APPENDIX C

NAVSUP STRATEGIC INFORMATION SYSTEMS PLAN STRATEGIES

I. INVENTORY MANAGEMENT

1. NAVSUP 04 will improve fleet readiness through inventory management by weapons system and by achieving the mean supply response time to meet readiness goals.

2. Wholesale material requirements determination emphasis will be on repairables and high essentiality consumables.

3. Navy will provision for all echelons of support.

* 4. Navy supply support will be provided through consumer, intermediate and wholesale echelons, with the long term intention that calculation of inventory levels for these echelons will be integrated to the maximum degree feasible.

II. DATA MANAGEMENT

* 5. NAVSUP will manage information as a corporate resource.

* 6. The Data Administration program will be implemented in NAVSUP to promote coordinated and integrated policies, programs, and procedures to efficiently and effectively manage and control corporate data and supporting resources.

* 7. Security procedures based on economic risk analyses will be used to protect information systems from erroneous denial of services, or unauthorized accidental/intentional destruction, modification, or disclosure.

* 8. Information systems will be designed to electronically collect, validate and process data as close to the source as possible.

III. SYSTEM INTEGRATION

* 9. NAVSUP 04 will emphasize the integration of logistics, business, and administrative information systems, through standard coding structures and common data bases.

* 10. NAVSUP 04 will establish a comprehensive long distance and local telecommunications network that provides all authorized users, ashore and afloat, ready access to logistics information in NAVSUP data bases.

IV. SYSTEM MODERNIZATION

* 11. NAVSUP 04 will improve the effectiveness and usefulness of its information systems by purifying data bases, acquiring efficient hardware, software, facilities and developing systems which meet customer needs.

12. Emphasis will be placed on functional requirements vice technical specifications for hardware and software procurements.

* 13. Portable and machine independent application programs will be developed to promote competition in future information systems resource acquisitions.

* 14. Proven, commercially available hardware and software products will be used.

V. QUALITY PERSONNEL

15. NAVSUP 04's employee training and development programs will emphasize improved job performance.

16. NAVSUP 04 will pursue a comprehensive employee quality of life program that enhances job satisfaction.

17. NAVSUP 04 will pursue a military and civilian manager mix that achieves an effective balance between continuity and innovation in key management positions.

18. SUP 04 will emphasize employee productivity, accountability, performance quality and related incentive systems.

VI. RESOURCE MANAGEMENT

* 19. All SUP 04 information systems actions will be initially justified by economic analyses and subsequently audited for achievement of analysis objectives.

* 20. NAVSUP 04 will optimize the use of FMSO resources for major standard information systems with emphasis on new systems development.

* 21. All SUP 04 information systems actions will be documented and managed through the SUP 04 Strategic and Tactical Information Systems Plan and will support the NAVSUP Corporate Plan and the Navy ISSP.

* 22. SUP 04 will apply Life Cycle Management procedures as the standard methodology for all Information Systems projects.

* 23. NAVSUP 04 will improve the effectiveness of its hardware, software, and facilities through the implementation of a configuration and capacity management program.

* 24. NAVSUP 04 will manage and control the cost of its data processing services through the initiation of customer charge-back systems.

25. NAVSUP 04 will implement the organization in accordance with the design concept.

VII. TECHNOLOGY EXPLOITATION

* 26. NAVSUP 04 will be the advocate for state-of-the-art technology in information system initiatives.

* 27. Technology refreshment will be built into all long term acquisition and budget strategies.

APPENDIX D

NAVSUP STRATEGIC INFORMATION SYSTEMS PLAN OBJECTIVES

I INVENTORY MANAGEMENT

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
1. Implement an improved AVCAL model (RIMAIR) at ASO.	3	86/3
2. Implement item essentiality codes and more accurate shortage cost estimates for ICP wholesale replenishment.	1,2	86/2
* 3. Implement sensitivity and trade-off analysis ("What If") capabilities to answer material/funds/effectiveness questions by ICP item manager.	1,2	86/2
4. Implement a uniform and improved wholesale provisioning model at ICPs.	3,2	87/4
* 5. Complete the implementation of the RIMSTOP capability at Navy activities.	4	91/4
6. Implement a sparing to availability model with item essentiality coding to develop a shipboard and aviation provisioning capability.	3,2	88/4

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 7. Identify the actions required to accelerate the implementation of the multi-echelon requirements determination model. (SUP 1)	4	86/4
8. Implement a multi-echelon requirements determination model (wholesale, intermediate, and consumer) for ICP replenishment by weapons systems. (SUP 18.d.)	4	95/4
9. Define and implement a system to measure supply and operational availability performance objectives by weapons system. (SUP 15)	1	89/4
10. Define those measurements, levels of application and systems required to determine the effectiveness of the supply system. (SUP 23)	1	86/2
* 11. Validate rules and integrate models for procurement and repair requirements determination. (SUP 17)	2,4	91/2
* 12. Develop and implement procedures to minimize repetitive buys of nonstandard and Navy managed items. (SUP 32)	4	88/4
13. Support the development of uniform weapons system and related essentiality coding. (SUP 16)	1	90/4
II DATA MANAGEMENT		
* 14. Establish an operational IRM program. (SUP 107)	5,9,25	86/4

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 15. Establish operational Data Administration and Data Base Administration Programs. (SUP 108)	6	86/2
* 16. Write NAVSUP's instruction on contingency planning incorporating OPNAVINST 5239.1	7	86/3
* 17. Rewrite the ADP security instruction, NAVSUPINST 5510.6A.	7	86/2
18. Develop ICP mobilization/ contingency plan.	7,11	87/1

III SYSTEM INTEGRATION

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 19. Define and overall information architecture that supports the NAVSUP business functions. (SUP 110)	9,6	86/3
* 20. Develop the data architecture that supports the overall information architecture. (SUP 112)	9,5	87/1
* 21. Based on the NAVSUP information architecture, develop and overall technical plan, including telecommunications, office automation, and security considerations, that exploits the technology available through existing and planned procurements such as SPLICE, ICP, and SPAR. (SUP 113)	9,7,11 23,12	87/3

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 22. Develop a policy which allows for interim but standard office automation systems at NAVSUP field activities, exclusive of ICPs.	9	85/4
23. Install an integrated office automation system in NAVSUP HQ.	9,8,11	88/2
* 24. Install a standard office automation architecture at NAVSUP field activities exclusive of ICPs and NSCs.	9,8,11	88/2
25. Install a local area network in NAVSUP HQ.	9,8,11	88/2
* 26. Install a logistics telecommunications network using the Defense Data Network (DDN) as the backbone. (SUP 81)	10,14	89/4
27. Develop and implement a network administration strategy.	10	87/1
* 28. Develop a plan to improve ship to shore communication of logistics information.	10	88/1
29. Install ICP secure network.	10,14,24	87/2
* 30. Complete installation of SPLICE initial hardware at 7 sites.	10	86/4
* 31. Complete installation of SPLICE upgrade configurations at 8 sites to support application implementation.	11	86/4

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 32. Complete transfer of communications devices from Burroughs communication processors to SPLICE communications subsystems at NAVSUP Stock Points.	10,23	86/4
* 33. Complete design, development and testing of SPLICE Phase II (MAPS support), and prototype at 7 sites.	10	86/4
* 34. Replace OLA PE 7/32s with SPLICE hardware at stock points.	11	87/1
* 35. Complete development of TCP/IP protocol for DDN, and prototype at one site.	10	86/2
* 36. Define and execute the integration requirements for on-going and planned initiatives such as SPLICE, SPAR, ICP Resolicitation and office automation through formal working group. (SUP 12 and 102)	9	89/1

IV SYSTEM MODERNIZATION

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 37. Implement the DOD Interchangeability and Substitutability System.	11,8,9 19,20	87/1
* 38. Develop a proposal for establishing and operating an Information Center at NAVSUP HQ.	11,8,9	86/4
39. Implement new weapons systems download requirements.	11,8,9 19,20	89/1

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
40. Implement Centralized Accounting and Billing (CAB) processing procedures at the Naval Avionics Center and the Level II Naval Air Stations.	11,8,9 19,20	86/4
41. Implement MILSCAP contract abstracting procedures at the ICPs.	11,8,9 19,20	85/3
* 42. Complete installation of Integrated Disbursing and Accounting applications on SPLICE hardware.	11,8,9 19,20	88/2
* 43. Prepare for implementation of IDA/FMS and NAVCIPS on NAVCOMPT provided ADPE and application software.	11,8,9 19,20	89/4
44. Revise automated NSF procedures in accordance with OSD direction.	11,8,9 19,20	88/4
45. Automate DLR GFM/GFE at contractor plants.	11,8,9 19,20	89/4
46. Modify financial and supply applications (UADPS and UICP) to implement end use funding of Aviation Consolidated Allowance Lists.	11,8,9 19,20	86/3
47. Develop and implement Coordinated Shipboard Allowance List (COSAL) download capability.	11,8,9 19,20	85/4
48. Install ICP hardware.	11,14,24	89/2

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
49. Complete ICP Transition.	11,20	87/2
50. Install ICP Office Automation Systems.	11,9,24	86/4
51. Implement "Lights Out" Data Center Plan at ICPs.	11,23,24	88/3
52. Ensure compatibility of inventory levels models and information systems design. (SUP 118)	11	89/2
53. Make a decision on the use of SAGE as a portability and/or conversion tool.	13	86/1
* 54. Develop a software portability plan.	13	86/4
55. Receive vendor proposals for SPAR hardware and systems software.	11,12,24	86/1
* 56. Complete development of the SPAR transition/conversion strategy.	13,19,20	86/1
57. Award a contract for SPAR hardware and system software.	11,12 22,24	87/2
58. Award a SPAR conversion contract.	11,12,14	87/3
59. Complete modernized UADPS-SP software development on the SPAR test bed.	11,8,13 19,20 21,22	89/3
60. Complete deployment of modernized UADPS-SP.	11,20,22	92/2

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 61. Complete APADE Phase I integrated system testing.	11,8,13	86/1
62. Receive SDP III approval for APADE.	11,19 21,22	86/3
* 63. Complete APADE installations.	11	88/4
64. Complete ICP Resystemization.	11,8,9 19,20,1 2,3,4	89/2
65. Install B4900s at NSC Norfolk.	11,14	85/3
66. Install B4800s and B4900s at selected stock points.	11,14	86/4
67. Eliminate B3500s from stock points.	11	86/4
* 68. Complete replacement of stock point obsolete peripheral equipment.	11	87/4
* 69. Eliminate PCAM equipment at ICPs, NSCs, CDAs, and other activities that are within NAVSUP control and from whom they receive input. (SUP 34)	11	91/1
70. Install uninterruptable power supply (including diesel generators) capability at the ICPs and NSCs.	11	87/2
71. Complete renovation of the NSC data processing facilities.	23	87/4

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
* 72. Incorporate decision support systems in SPAR and ICP Resolicitation that provide the information required for activity management and HQ feedback. (SUP 114)	11	89/3
* 73. Develop and execute the methodology to eliminate errors in existing stock point and ICP data bases and insure the quality of new input. (SUP 106)	11	89/3
74. Transition CAIMS.	11,14	86/2
75. Resystemize CAIMS.	11,12,13 14,19	88/2

V QUALITY PERSONNEL

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
76. Facilitate SUP 04 modular furniture installation and physical relocation.	16	86/1
77. Develop a SUP 04 organizational strategy paper and presentation appropriate for use at all 04 employee levels.	25	85/4
78. Develop a position description and create a position for a SUP 04 administrative/management assistant.	25	85/4
79. Develop an integrated SUP 04 training plan which incorporates, consolidates, and tracks current and future training initiatives, including those provided through ICP Resolicitation, SPAR, and SPLICE.	15,18	85/4

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
80. Develop Individual Development Plans for each employee within NAVSUP 04.	15	86/1
81. Write position descriptions for and initiate personnel actions for all positions in the new organization.	25	85/4
82. Write mission/purpose/goals for each SUP 04 branch.	25	86/1

VI RESOURCE MANAGEMENT

83. Implement a consolidated budget focal point within SUP 04.	19	86/2
84. Establish policy and procedures for implementing and maintaining the SUP 04 strategic and planning process.	21	85/4
85. Institutionalize a formal planning process which supports the requirements of SECNAVINST 5230.9.	19	86/2
86. Publish NAVSUP LCM instruction to implement SECNAVINST 5231.1B	22	86/1
87. Establish a policy for executing and monitoring the self-financing program to ensure the focusing of CDA resources. (SUP 62)	20	85/4
88. Develop policy and procedures for economic analyses and auditing requirements for system development efforts. (SUP 43)	19	86/3

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
89. Develop and publish procedures for documenting "lessons learned".	21	86/1
* 90. Establish a policy for management of local unique applications.	19,22	86/2
91. Determine the feasibility of using the operational availability equation to measure the level of service provided by Automated Information Systems (AIS). (SUP 97)	19	86/4
* 92. Develop and implement an operational hardware and environmental software management program.	23	89/2
* 93. Develop and implement an operational capacity management program.	23	89/2
* 94. Implement a charge-back system to manage and/or recover costs from users of the ICP and stock point data centers and networks.	24,14	87/1
95. Develop a policy to transfer ADPE, telecommunications, environmental software, and resystemized application programs from project to functional manager.	25	86/2

OBJECTIVE	STRATEGY	(FY/Q) TARGET DATE
VII TECHNOLOGY EXPLOITATION		
* 96. Establish an emerging technology program. (SUP 70)	25	86/2
* 97. Develop policy and techniques for the infusion of new and emerging technology into NAVSUP information systems.	26,27	86/2
* 98. Develop and maintain a technical reference library on state-of-the-art technology for hardware, software, and system integration techniques.	26	86/3

ATTACHMENT E

CURRENT SPLICE STRATEGIES

SUPPORT STRATEGIES

1. Enable implementation of new UADPS-SP projects without saturation of the existing Stock Point system hardware.

2. Provide the Stock Points with the interactive capabilities required by new projects or download "functionally transparent" UADPS-SP applications.

3. Develop modular telecommunications subsystem independent of the current Stock Point computer systems which will simplify the eventual replacement of the Stock Point computer systems at the end of their useful life.

4. Provide bulk file transfer capability for support of sites being provided Multiple Activity Processing System (MAPS) UADPS-SP access from another SPLICE location.

5. Develop a SPLICE network wherein a Stock Point, functioning as a node in the network, will exchange information with other Navy Stock Points, Navy Inventory Control Points or DLA Stock Points with the nodes of the SPLICE network connected via DDN or via commercial communications facilities.

6. Protect the existing UADPS-SP programs from obsolescence until modernization by the Stock Point Replacement Project; permit background processing with Stock Point computers together with SPLICE interactive and telecommunications functions.

7. Avoid disruption of Stock Point systems' processing during SPLICE installation and implementation phases; configure, operate SPLICE systems to assure improvement of Stock Point processing and throughput.

* 8. Locate the SPLICE hardware at sites currently processing Stock Point systems in order to assure system integration, expedite testing and installation and establish standardized nodes within the SPLICE network.

DESIGN STRATEGIES

* 9. Acquire standard hardware and software configurations for modular implementation at Stock Point and remote sites.

10. Establish a standardized telecommunications network.

11. Develop common interactive telecommunications interface(s) among Stock Points, remote sites, terminal configurations.

* 12. Support stand-alone processing.

* 13. Support front-end processing.

* 14. Interface with various existing Stock Point hardware (for example, Burroughs, Perkin-Elmer, IBM, Univac, Tandem).

15. Absorb maximum communications functions currently resident on Stock Point host systems (to free host capacity).

* 16. Insulate the applications from terminal and device unique characteristics, storage media, interprocess routing, and network connectivity.

* 17. Use modular hardware and software that will allow expansion and consolidation as workloads and requirements change throughout the system's life.

18. Use off-the-shelf environmental (system) hardware and software to support system availability and data integrity so that only single and most multiple component failures will not limit access to the system by system users.

19. Allow non-SPLICE computer systems at sites to communicate with each other without routing messages through the SPLICE processors.

20. Develop a centralized network.

21. Prepare a teleprocessing framework for the Stock Point Replacement Project.

22. Replace selected MAPS RJE equipment with SPLICE hardware/software; expand current remote and local processing features.

ECONOMIC STRATEGIES

* 23. Acquire systems specifically engineered, configured to meet specific Stock Point telecommunications requirements

and provide enhanced interactive processing features not available under Stock Point systems.

* 24. Acquire systems that can absorb multiple Stock Point front-end applications thus eliminating separate terminal systems for each project implementation and consolidating/reducing hardware, hardware maintenance and personnel costs.

25. Install and implement SPLICE in a phased manner to assure installation success, provide adequate time for testing in a phased approach, etc.

* 26. Specify and acquire systems that can be configured in standardized units.

* 27. Select limited numbers of applications for initial SPLICE processing.

* 28. Locate the SPLICE system in the same facilities with Stock Points computers to reduce site/facility costs, operator requirements, transmission, transportation, and logistics costs.

* 29. Configure SPLICE to process in association with Stock Point systems thus sharing workloads, reducing operating costs, etc.

30. Reduce telecommunications line costs by using a single communications line and single work station to access data bases residing on multiple local host computers as well as remote computers.

* 31. Acquire SPLICE systems based on requirements to (a) support current UADPS-SP and (b) thereafter to support the Stock Point Replacement Project.

32. Design SPLICE as a telecommunications foundation for the Stock Point Replacement Project to permit, if required, phased transition to the Replacement environment.

APPENDIX F

PROPOSED SPLICE PROJECT STRATEGIES

I. INVENTORY MANAGEMENT

1. In that Navy supply support will be provided through consumer, intermediate and wholesale echelons, SPLICE will serve as an horizontal and verticle integration vehicle through system wide telecommunications capabilities and provide a window to stock point data and processes (where security permits) to all echelons of the NAVSUP corporation. (NSISP Strategy 4; SPLICE Goal 1)

II. DATA MANAGEMENT

2. SPLICE will support an environment and monitor the development of applications which can provide data and asset visibility so that information is managed as a NAVSUP corporate resource. (NSISP Strategy 5; SPLICE Goal 2)

3. SPLICE will adhere to the NAVSUP Data Administration program to promote coordinated and integrated policies, programs, and procedures to efficiently and effectively manage and control corporate data and supporting resources. (NSISP Strategy 6; SPLICE Goal 2)

4. SPLICE will ensure that all implemented security procedures are based on economic risk analyses and will be used to protect information systems from erroneous denial of services, or unauthorized accidental/intentional destruction, modification, or disclosure. (NSISP Strategy 7; SPLICE Goal 3)

5. SPLICE information systems will be designed to electronically collect, validate and process data as close to the source as possible. (NSISP Strategy 8; SPLICE Goal 4)

III. SYSTEM INTEGRATION

6. SPLICE will emphasize the integration of logistics, business, and administrative information systems, through the use of standard SPLICE minicomputer hardware (including MAPS site replacement), standard coding structures, commom data elements, and common data bases (where practical). (NSISP Strategy 9; SPLICE Goals 1 and 3)

7. SPLICE will will serve as the basis for an economic and comprehensive long distance and local telecommunications network using DDN or commercial facilities, that provides all authorized users, ashore and afloat, ready access to logistics information in NAVSUP data bases from single terminals and provide bulk file transfer capabilities, . (NSISP Strategy 10; SPLICE Goals 1, 2, and 3)

IV. SYSTEM MODERNIZATION

8. SPLICE will improve its effectiveness and usefulness by protecting existing UADPS-SP programs from obsolescense until SPAR, providing stock point interactive capabilties, permitting the download of "functionally transparent" and site local stock point applications, purifying data bases, acquiring efficient hardware, software, facilities, developing systems which meet customer needs, and providing a telecommunications and office automation foundation for the SPAR project to permit, if required, phased transition to the Replacement environment. (NSISP Strategy 11; SPLICE Goals 1, 2, and 3)

9. All SPLICE resident functional area COBOL applications will be portable and machine independent in order to promote competition in future information systems resource acquisitions and in preparation for SPAR. (NSISP Strategy 13; SPLICE Goal 3)

10. SPLICE will use proven, commercially available hardware and software products, where possible, implemented in a phased manner to assure installation success and provide for adequate test time. (NSISP Strategy 14; SPLICE Goal 5)

VI. RESOURCE MANAGEMENT

11. All SPLICE environmental and application actions will be initially justified by economic analyses and subsequently audited for achievement of analysis objectives. (NSISP Strategy 19; SPLICE Goal 5)

12. SPLICE will optimize the use of its FMSO resources for major standard information systems with emphasis on new systems development. (NSISP Strategy 20; SPLICE Goal 5)

13. SPLICE project actions will be documented and managed through the SUP 04 Strategic and Tactical Information Systems Plan and will support the NAVSUP Corporate Plan and the Navy ISSP. (NSISP Strategy 21; SPLICE Goal 5)

14. SPLICE will continue to apply Life Cycle Management procedures as the standard methodology for all its programs

and ensure same for supported projects. (NSISP Strategy 22; SPLICE Goal 5)

15. SPLICE will improve the effectiveness of its hardware, software, and facilities through participation in the NAVSUP configuration and capacity management program, with particular emphasis on ensuring that new UADPS-SP projects do not saturate existing stock point hardware. (NSISP Strategy 23; SPLICE Goal 5)

16. SPLICE will provide a customer charge-back system, through which its customers/users can manage and control the cost of data processing services. (NSISP Strategy 24; SPLICE Goal 5)

VII. TECHNOLOGY EXPLOITATION

17. SPLICE will advocate and provide for state-of-the-art technology in its information system initiatives. (NSISP Strategy 26; SPLICE Goal 7)

18. SPLICE will provide technology refreshment throughout its life-cycle through periodic site upgrades, government or vendor recommended component substitutions, and supporting budget strategies. (NSISP Strategy 27; SPLICE Goal 7)

APPENDIX G

PROPOSED SPLICE PROJECT OBJECTIVES

I INVENTORY MANAGEMENT

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
1. Implement sensitivity and trade-off analysis ("What If") capabilities to answer material/funds/effectiveness questions by Stock Point item managers through the use of SPLICE locally networked microcomputers. (NSISP Objective 3,72)	1,2,5, 8,10,17	86/4
2. Initiate the implementation of the RIMSTOP capabilities through SPLICE at Navy Stock Point activities. (NSISP Objective 5)	1,2	91/4
3. Identify the actions required to accelerate the implementation of the multi-echelon requirements determination model through implementation of planned RIMSTOP capabilities on SPLICE. (NSISP Objective 7)	1,2	86/4
4. Validate rules and integrate models for procurement and repair requirements determination at Stock Points through APADE. (NSISP Objective 11)	1	91/2

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
5. Develop and implement procedures to minimize repetitive buys of nonstandard of Stock Point retail managed items through APADE and provide greater asset visibiliy. (NSISP Objective 12)	1,2	88/4

II DATA MANAGEMENT

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
6. Participate in the NAVSUP IRM program. (NSISP Objective 14)	2,6	86/4
7. Participate in the NAVSUP Data Administration and Data Base Administration Programs. (NSISP Objective 15)	3	86/2
8. Provide SPLICE input to the NAVSUPINST on contingency planning. (NSISP Objective 16)	4	86/3
9. Provide SPLICE input to the ADP security instruction, NAVSUPINST 5510.6A based upon FDC's Security Access System. (NSISP Objective 17)	4	86/2

III SYSTEM INTEGRATION

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
10. Provide SPLICE input to the NAVSUP information architecture that supports the NAVSUP business functions. (NSISP Objective 19)	6,3	86/3
11. Provide input to the NAVSUP data architecture that supports the overall information architecture. (NSISP Objective 11)	6,2	87/1

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
12. Based on the NAVSUP information architecture, develop SPLICE technical plans, including telecommunications, office automation, and security considerations, that exploit the technology available through the SPLICE procurement. (NSISP Objective 21)	6,4,8 15	87/3
13. Develop a SPLICE tactical plan which provides interim but standard office automation systems at NAVSUP field activities, exclusive of ICPs. (NSISP Objective 22)	6	86/4
14. Install a TANDEM based standard office automation architecture at NAVSUP field activities exclusive of ICPs, FMSO, and NSCs. (NSISP Objective 24)	6,5,8	88/2
15. Install a SPLICE based logistics telecommunications network using the Defense Data Network (DDN) as the backbone. (NSISP Objective 26)	7,10	89/4
16. Develop and implement a SPLICE based plan to improve ship to shore communication of logistics information. (NSISP Objective 28)	7	88/1
17. Complete installation of SPLICE initial hardware at 7 sites. (NSISP Objective 30)	7,8	86/4
18. Complete installation of SPLICE upgrade configurations at 8 sites to support application implementation. (NSISP Objective 31)	7,8	86/4

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
19. Complete transfer of communications devices from Burroughs communication procesors to SPLICE communications subsystems at NAVSUP Stock Points. (NSISP Objective 32)	7,15	86/4
20. Complete design, development and testing of SPLICE Phase II (MAPS support), and prototype at 7 sites. (NSISP Objective 33)	7	86/4
21. Replace OLA PE 7/32s with SPLICE hardware at stock points and implement DDA project on same. (NSISP Objective 34)	8	87/1
22. Complete development of TCP/IP protocol and service protocols for DDN on SPLICE, and prototype at one site. (NSISP Objective 35)	7	86/2
23. Provide for SPAR, ICP Resolicitation, shipboard, logistics system, and office automation integration requirements in all planned SPLICE initiatives. (NSISP Objective 36)	6	89/1

IV SYSTEM MODERNIZATION

24. Participate in the implementation of the DOD Interchangeability and Substitutability System, through on-line implementation of the ML-N, MRIL and MCRL on SPLICE. (NSISP Objective 37)	8,5,6 11,12	87/1

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
25. Develop a proposal for interfacing to an Information Center at NAVSUP HQ. (NSISP Objective 25)	8,5,6	86/4
26. Complete installation of Integrated Disbursing and Accounting applications on SPLICE hardware. (NSISP Objective 42)	8,5,6 11,12	88/2
27. Prepare for implementation of IDA/FMS and NAVCIPS on NAVCOMPT provided ADPE and application software, using SPLICE telecommunications facilities. (NSISP Objective 43)	8,5,6 11,12	89/4
28. Develop a TANDEM based software portability plan. (NSISP Objective 54)	9	86/4
29. Provide input to the SPAR transition/conversion plan for SPLICE resident applications and telecommunications facilities. (NSISP Objective 56)	9,11,12	86/1
30. Assist in APADE Phase I integrated system testing, perform sizing studies, and provide hardware interface and environmental software/testing support. (NSISP Objective 61)	8,5,9	86/2
31. Complete APADE installations; assist in APADE prototype; tune appliction after installation. (NSISP Objective 63)	8	88/4

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
32. Assist in the replacement of stock point obsolete peripheral equipment, by replacing with SPLICE equipment where possible. (NSISP Objective 68)	8	87/4
33. Eliminate PCAM equipment at NSCs and other activities that are within NAVSUP control through SPLICE OLTP facilities and from whom they receive input through providing SPLICE telecommunications interfaces. (NSISP Objective 69)	8	91/1
34. Incorporate decision support systems (downloads and micro based) in SPLICE that provide the information required for activity management and HQ feedback. (NSISP Objective 72)	8	89/3
35. Develop and execute a methodology to eliminate errors in existing stock point data bases through increased use of OLTP and insure the quality of new input. (NSISP Objective 73)	8	89/3
VI RESOURCE MANAGEMENT		
36. Enforce the policy for management of local unique applications at stock points on SPLICE. (NSISP Objective 36)	11,14	86/2
37. Participate in the NAVSUP operational hardware and environmental software management program through the SPLICE Configuration Management System. (NSISP Objective 92)	15	89/2

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
38. Participate in the NAVSUP operational capacity management program through SPLICE capacity expansion, system sizing and resource management systems. (NSISP Objective 93)	15	89/2
39. Implement a SPLICE charge-back system to manage and/or recover costs from users of stock point data centers and networks. (NSISP Objective 94)	16,10	87/1
VII TECHNOLOGY EXPLOITATION		
40. Provide SPLICE inputs to the NAVSUP emerging technology program. (NSISP Objective 96)	17,18	86/2
41. Using the SPLICE contract substitution clause and LCN interface capability, provide for the infusion of new and emerging technology into NAVSUP information systems. (NSISP Objective 97)	17,18	86/2
42. Provide SPLICE related inputs to the NAVSUP technical reference library on state-of-the-art technology for hardware, software, and system integration techniques. (NSISP Objective 98)	17,	86/3

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
43. Implement SPLICE ABE at 8 NAVSUP stock points. (NSISP Objectives 31, 32, 56, 73)	1,5,6 8,9,11, 12	4/87
44. Incorporate bar code technology (i.e., readers and medium duty bar code printing laser devices) into SPLICE and implement on applicable supported applications. (NSISP Objectives 68, 69, 73, 97)	2,5,8, 10,17,18	3/86
45. Support the download or SPLICE disk placement of additional Burroughs Master or tape files (e.g., MRIL, ML-N, MCRL, etc.) for inquiry, stand alone processing and source data purposes (NSISP Objectives 21, 56, 68, 69, 73)	1,2,5, 6,7,8	1/87
46. Expedite the movement of End-of-Day procesing to SPLICE, using the SPLICE maintained TRANSRECON. (NSISP Objectives 21, 56, 68, 69, 73)	1,2,8, 15	2/87
47. Support and expedit the transition of NAVADS to the SPLICE Environment. (NSISP Objectives 21, 31, 56, 68, 69, 73)	2,5,6 7,8,15	4/86
48. Support and expedit integration of NISTARS concepts and programs into SPLICE. (NSISP Objectives 21, 56, 68, 69, 73, 97)	2,5,6 8,9,10 12,15,17	4/86
49. Support and expedit the elimination of card oriented inventory processes by transition of inventory tool creation to SPLICE using OLTP. (NSISP Objectives 21, 56, 68, 69, 73, and 97)	2,5,6 8,9,10 12,15,17	4/86

OBJECTIVE	SPLICE STRATEGY	(FY/Q) TARGET DATE
50. Support the implementations and enhancements of SPLICE TLOD. (NSISP Objectives 21, 56, 68, 69, 73, and 97)	2,5,6 8,9,10 12,15,17	4/86

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An integration, long range planning, and migration guide for the Stock Point Logistics Integrated Communications project.